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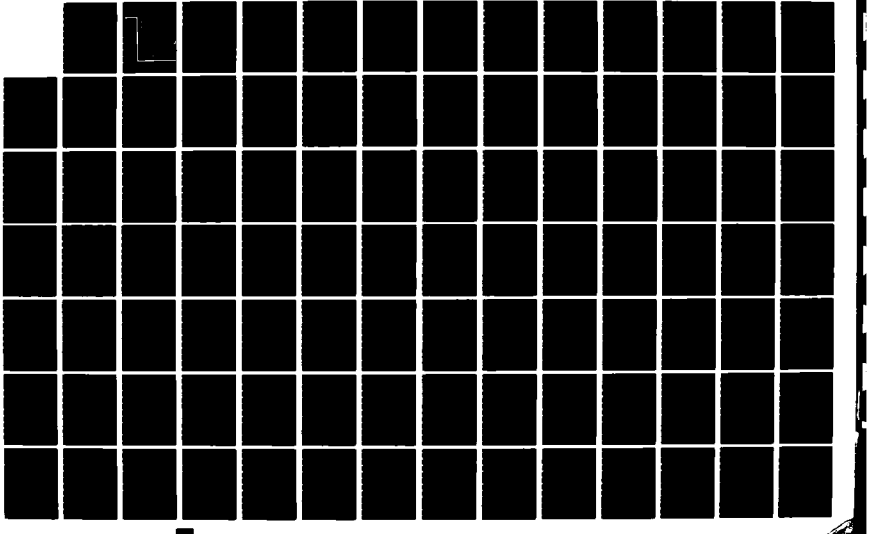

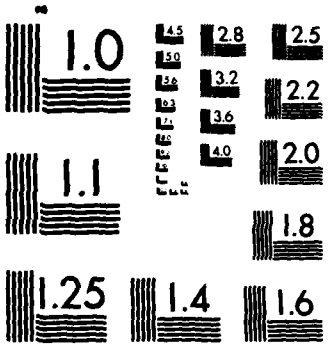

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ARMED SERVICES VOCATIONAL APTITUDE BATTERY: EQUATING AND IMPLEMENTATION OF FORMS 11, 12, AND 13 IN THE 1980 YOUTH POPULATION METRIC

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The Armed Services Vocational Aptitude Battery (ASVAB) is routinely updated in order to replace obsolete items, to take advantage of advances of psychometrics, and to lessen the exposure of the battery to compromise. This paper documents the equating of new versions of the ASVAB Forms 11, 12, and 13 to ASVAB Form 8a, the reference test. The new tests were equated on a new score scale developed from a 1980 sample of American youth ages 18 through 23. The study describes the equating design, the methods used in equating the new forms to the anchor test, the description of issues surrounding the speeded subtests of the ASVAB, and a description of the resolution of the issues. Three equating methods were accomplished and compared for samples of military recruits and applicants. Results of the equatings revealed that a linear conversion table, based on applicants tested in the Military Entrance Processing Stations, would serve for five of the six new tests, and a linear conversion table based on linear equating of military recruits in Recruit Training Centers would be satisfactory for the remaining version. Special studies to adjust scores on the speeded subtests of the ASVAB are described in this paper, and resultant tables are presented.

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SUMMARY

This paper describes the equating of the Armed Services Vocational Aptitude Battery (ASVAB) Forms 11, 12, and 13 to the reference test, ASVAB Version 8a. This paper deals with: (a) the equating study design, (b) the methods used in equating, (c) the results of the equating, and (d) the resolution of issues surrounding the speeded subtests of the ASVAB.

The equating study was planned as a two-phased, equivalent groups design using applicants for the armed services at Military Entrance Processing Stations (MEPS) and service recruits at Recruit Training Centers (RTCs). 63,000 applicants took partial batteries of one of the six parallel forms of the newly developed candidate ASVABs (version 11a) and like-named subtests from ASVAB 8a and approximately 14,000 recruits took one of seven complete batteries at RTCs. Equatings were separately accomplished for linear, equipercentile, and smoothed equipercentile equating methods in both RTC and MEPS samples. Comparison of the various equating methods was accomplished using several deviation indices computed on raw scores for weighted and unweighted samples. Results of the comparisons revealed that one version of the candidate forms (version 12a) was deviant from the other five versions and a separate conversion table, based on a linear equating of that version in the RTCs, would be satisfactory for operational use.

Conversion tables based on linear equating of ASVAB version 11a in the MEPS appeared satisfactory for the remaining five versions. Comparison between the linear equating method and the other methods revealed very small differences; hence the linear equatings method was chosen for both the RTC and MEPS because fewer parameters needed to be estimated.

Issues surrounding differences in performance between subjects in the 1980 youth population and military applicants on the two speeded subtests (Numerical Operations and Coding Speed) of the ASVAB were described and resolution of the issues proposed. Adjustments to the proposed conversion tables were accomplished using linear equating for the Coding Speed subtest and smoothed equipercentile equating for the Numerical Operations subtest. Evaluation of the speeded subtest issue indicated that the differential performance of the normative population could be satisfactorily accounted for by differences between the answer sheets used in the standardization study and the operational answer sheets. Adjustments to the 1980 score scale using linear and smoothed equipercentile equating satisfactorily accounted for all differences in performance between applicants and the 1980 youth sample. Finally, operational conversion tables were proposed and included in this paper. Based on the results of the equating study and the resolution of the speeded subtest issues, it is recommended that the ASVAB Forms 11, 12, and 13 be implemented, using the 1980 youth population metric, and that an Initial Operational Test and Evaluation of the conversion tables be accomplished.

PREFACE

This technical paper describes the equating of the newly developed Armed Services Vocational Aptitude Battery (ASVAB) Forms 11/12/13 to ASVAB version 8a. The equating of the new versions of ASVAB was accomplished to transfer normative information based on the 1980 youth population scores on ASVAB 8a. Developmental information contained in this paper came from the Ominibus Item Pool and Test Development Project (Contract F-33615-81-C-0020), completed by Assessment Systems Corporation, St Paul, MN, for the Air Force Human Resources Laboratory (AFHRL)

Appreciation is expressed to Dr William Alley of AFHRL and to members of the Defense Advisory Committee on Military Personnel Testing for their suggestions and contributions to this project.

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I. INTRODUCTION

This paper describes the equating of the Armed Services Vocational Aptitude Battery (ASVAB) Forms 11/12/13 to ASVAB version 8a (established as the reference test). The equating was accomplished in order to transfer normative information, based on the 1980 Youth Population scores on ASVAB version 8a, to ASVAB Forms 11/12/13. This paper further addresses issues surrounding the 1980 Youth Population scores on the speeded subtests and the resolution of those issues.

The paper gives a brief background description of the ASVAB, which applies to the current Forms 8/9/10 as well as to the new Forms 11/12/13. Only brief mention is made of the actual development of Forms 11/12/13. The main subject of this paper is the equating of the new forms. The body of the paper is divided into four parts: (a) the equating design, (b) the actual equating, (c) the results of the equating, and (d) the resolution of issues surrounding the speeded subtests of the ASVAB. A detailed exposition of the development of the new forms is available in Prestwood, Vale, Massey, and Welsh (1985).

II. BACKGROUND

The ASVAB is the selection and classification test used for enlistment qualification and job placement in the Army, Navy, Air Force, Marine Corps, and Coast Guard. The research and development (R&D) in support of the ASVAB is performed by the Air Force as the executive agent for ASVAB R&D in the Department of Defense (DOD). The Air Force Human Resources Laboratory is the lead personnel research laboratory for ASVAB R&D and, with the cooperation of other service laboratories, was the principal agency responsible for the development and equatings of the new ASVAB Forms 11/12/13. The operational administration of the test battery is performed by the Military Entrance Processing Command (MEPCOM) under the executive direction of the Department of the Army.

The ASVAB

The ASVAB is a multiple aptitude battery currently consisting of 10 subtests that measure verbal, mathematical, technical, and speeded performance in a testing session of approximately 3 hours. Eight of the subtests are power subtests; two are speeded. Table 1 provides the name, abbreviation, length, and power/speed classification of the subtests.

Table 1. ASVAB Subtests

Name	Number of Items	Power/Speed
General Science (GS)	25	Power
Arithmetic Reasoning (AR)	30	Power
Word Knowledge (WK)	35	Power
Paragraph Comprehension (PC)	15	Power
Numerical Operations (NO)	50	Speed
Coding Speed (CS)	84	Speed
Auto & Shop Information (AS)	25	Power
Mathematics Knowledge (MK)	25	Power
Mechanical Comprehension (MC)	25	Power
Electronics Information (EI)	20	Power

Each form of ASVAB has two versions (e.g., Form 11 has versions 11a and 11b). The two versions of a given form have four subtests (AR, WK, PC, and NO) in which there are no common items between versions and six subtests (GS, CS, AS, MK, MC, and EI) which are identical between versions except for slight differences in item order. The four unique subtests are often referred to as the head of an ASVAB and the six common subtests are called the tail. Each form thus has two versions that have unique heads but a common tail. Every 3 or 4 years, another set of three forms (six versions) of the ASVAB is developed and implemented. This periodic replacement is accomplished in order to minimize the effects of test exposure, to replace test items that may become obsolete, and to take advantage of advances in psychological measurement.

Composites

ASVAB subtest scores are combined into composites for selection and classification purposes. The general selection composite, the Armed Forces Qualification Test (AFQT), is used by all the services and the DOD headquarters to report on one aspect of the quality of enlisted accessions. The AFQT is also the measure used by Congress to track the mental qualification of the enlistees in the various services. AFQT scores are created by summing the raw scores of AR, WK, PC, and half-weighted NO and by converting this sum of raw scores to a normative percentile score (see Appendix A). The percentile is currently referenced to a World War II mobilization population.

Apart from the general selection composite used primarily for reporting purposes, a second kind of composite is used by the services for selection and classification. The individual services have their own unique career fields and require a special mix of aptitudes in their recruits. For this reason, selection and classification is accomplished using service-specific composites.

For a number of years, the individual services have each chosen to base their composite scores on sums of standardized subtest scores (SSSs). The subtest raw scores are standardized via a linear transformation to a mean of 50 and a standard deviation of 10. In addition, the raw scores of WK and PC are added together to form a composite called Verbal (VE), which is also standardized to a mean of 50 and a standard deviation of 10. In practice VE is treated as an eleventh subtest. These subtest standard scores are restricted to the range of 20 to 80.

Each service chooses its own method for creating operational composite scores from the SSS; usually based on validity information related to success in the services' technical training schools. The Air Force associates the percentile scores, based on a reference population, with each composite SSS. The Army, Marine Corps, and Coast Guard transform the SSSs to composite standard scores with means of 100 and standard deviations of 20 via another linear transformation. The Navy uses the SSSs, as operational scores, without further manipulation. Table 2 gives the current composites for ASVABs 8/9/10. The Marine Corps and Army are changing their composites for ASVABs 11/12/13.

1944 Norms

Current ASVABs (Forms 8/9/10) and past ASVABs have been normed to a reference base of approximately 1,000,000 World War II men in uniform, tested in December 1944. This reference group is called the 1944 mobilization population or the WWII mobilization population. The reference tests used to generate the 1944 norms were the Army General Classification Test, Form 1c, and the Navy General Classification Test, Form 1 (Stuit, 1947; Uhlaner & Bolanovich, 1952). The score metric based on the 1944 mobilization population is frequently termed the 1944 metric or the 1944 scale.

Tests are scaled in the 1944 metric by equating or calibrating. Calibration and equating are the same mathematical process--if the two tests are content parallel, of the same difficulty and the same reliability, the process is equating; otherwise the process is called calibrating (see Angoff, 1971 for an elaboration of this distinction). Each new form of the ASVAB has been calibrated to a reference test which has been previously calibrated in the 1944 metric. The 1944 metric is then passed on to scores on the new test. ASVAB Forms 8/9/10 service composites and the AFQT were calibrated to the 1944 metric with a 1960s selection test, Armed Forces Qualification Test, Form 7a. Details of this calibration and its evaluation are found in Ree, Mathews, Mullins, and Massey (1982).

Norms and Equating

ASVAB norms are thus dependent on two separate procedures: the equating to a reference test, and the (usually long since accomplished) norming of the reference test. It is not feasible to develop a new reference scale for each new set of ASVABs because the operational selection and classification procedures are metric dependent and would have to be unique to each new set of ASVABs. However, when operational scores in 1984 depend on a chain of

Table 2. Composites Equated for ASVAB 11/12/13

Service	Composite	Definition
All	AFQT	WK+PC+AR+1/2NO
	VE	WK+PC
Army	ARGT	VE+AR
	ARGM	MK+EI+AS+GS
	AREL	AR+MK+EI+GS
	ARCL	NO+CS+VE
	ARMM	NO+AS+MC+EI
	ARSC	NO+CS+AS+VE
	ARCO	CS+AR+MC+AS
	ARFA	AR+CS+MC+MK
	AROF	NO+AS+MC+VE
	ARST	VE+MC+MK+GS
Navy	NEL	AR+MK+EI+GS
	NE	AR+GS+2MK
	NCL	NO+CS+VE
	NGT	VE+AR
	NM	VE+MC+AS
	NEG	MK+AS
	NAM	VE+MC
	NCT	VE+AR+NO+CS
	NNF	MK+EI+GS
	NHM	VE+MK+GS
	NST	VE+AR+MC
	NTM	AR+MC
Air Force	AFM	MC+GS+2AS
	AFA	NO+CS+VE
	AFG	VE+AR
	AFE	AR+MK+EI+GS
Marine Corps	MCMM	AR+EI+MC+AS
	MCCL	VE+MK+CS
	MCGT	VE+AR+MC
	MCEL	AR+MK+EI+GS
	MCGM	GS+AS+MK+EI
	MCCO	NO+AS+VE
	MCFA	AR+AS+VE

equatings of tests back to 1944, it is reasonable to assume a given operational test score earned in 1984 may not indicate exactly the same aptitude as that score indicated in 1944. This scale drift is highly undesirable.

1980 Norms

In addition to the possibility of scale drift over time, other factors weigh against the continued use of the 1944 norms. The norms are male norms, and the services have been enlisting large numbers of women. Also, knowing the mental ability of a service's accessions relative to 1944 military men does not allow service personnel managers to know how the services are doing relative to the current market of potential enlistees in the 1980s--an important concern in this volunteer (nondraft) era.

In order to provide current norms, the DOD and the services, in cooperation with the Department of Labor, sponsored the Profile of American Youth study. This study used the testing of a weighted probability sample of American youth on which to establish current national norms for the ASVAB. The National Opinion Research Center (NORC) of the University of Chicago, under contract with the DOD, tested about 12,000 youths on ASVAB Form 8a, from July through October 1980 (Office of the Assistant Secretary of Defense, 1982). This sample was weighted to represent American youths, ages 16-23 years of age. A subset of this sample, 18-through 23-year-old males and females, formed the new reference population for the ASVAB and is referred to as the 1980 Youth Population.

Subtests of the ASVAB 8a were standardized in the Youth Population. Composite sums of standard scores were transformed to a 1980 score scale. Comparisons have been made between the 1944 score scale and the new 1980 score scale (see Maier & Sims, 1982; Ree, Valentine, & Earles, 1985). The construction of a 1980 Youth Population norm permits scores for future ASVABs to be stated in the 1980 metric. This can be done by equating new test scores to ASVAB version 8a. Thus, ASVAB Forms 11/12/13 were equated to version 8a in order to permit the reporting of ASVAB Forms 11/12/13 scores in the 1980 metric. An Initial Operational Test and Evaluation (IOT&E) is planned to check the accuracy of these equatings. An IOT&E involves the recomputation of conversion tables and comparisons of these tables with the operational tables used at implementation. Data are collected on all new versions and the reference test at all the Military Entrance Processing Stations (MEPS) during the first 3 months of operation. The first IOT&E of ASVAB was conducted shortly after the implementation of ASVAB 8/9/10 in October 1980, and the second IOT&E was tentatively scheduled for October 1983 after the planned implementation of ASVAB 11/12/13 in the 1980 metric.

Speeded Subtest Issue

Shortly after the decision was made to implement ASVAB Forms 11/12/13 in the 1980 metric, some anomalies were noted by Sims and Maier (1983) on speeded subtest performance between the 1980 youth population and military applicants/recruits. The 1980 youths performed relatively more poorly on the speeded subtests when compared to military applicants/recruits.

Review of the Youth Aptitude Profile Study (McWilliams, 1980) revealed that the 1980 youth sample responded to ASVAB 8a on answer sheets that were different from operational answer sheets used by military applicants. An experimental study on Air Force recruits by Earles, Wegner, Ree, and Valentine (1983) identified the type of answer sheets used in the Youth Aptitude Profile study as the probable source of the anomaly. A subsequent investigation of the answer sheet differences using military applicants (Wegner & Ree, 1985), replicated the early findings and provided a conversion table to adjust for the effects of the "slower" (non-operational) answer sheet.

Subsequent sections of this paper will cover in detail the equating of ASVAB 11/12/13 and the subsequent adjustments to the 1980 score scale to account for the differential performance of the normative group on the speeded subtests of the ASVAB.

III. PART I. EQUATING STUDY DESIGN AND OPERATIONAL PLAN

Six new versions of the ASVAB were developed through an iterative process that successively culled candidate test items using three samples of examinees of increasingly broader ability range. The first round of item culling was accomplished using a sample of Air Force recruits, while the second sample used recruits from all the services' training centers. Finally, candidate ASVABs were administered to a large sample of applicants at the MEPS. Each successive sample was more expensive in terms of time, disruption, and cost. This process yielded six new candidate versions of the ASVAB, and these contained six unique AFQTs and three unique classification portions of the battery (six heads and three tails). The development of the items and candidate forms is described in detail elsewhere (Prestwood, Vale, Massey, & Welsh, 1985). These six candidate versions were designated 11a, 11b, 12a, 12b, 13a, and 13b and were equated to ASVAB 8a using data collected between January and March of 1983. The equating study design and the plan to implement that design were generated by the Joint Services Selection and Classification Working Group and approved by the Defense Advisory Committee on Military Personnel Testing (DAC) in August 1982.

Study Design and Rationale

The design of the equating study for ASVAB Forms 11/12/13 equated the new tests to a reference test (ASVAB 8a) that was parallel in content to the candidate batteries. ASVAB Forms 11/12/13 were constructed to be parallel in content, difficulty, and reliability to the reference test (ASVAB 8a) by the method of stratified parallel forms described elsewhere (Ree, Mathews, Mullins, & Massey, 1982). Because the new batteries were content parallel, an equating, as opposed to a calibration, was conducted.

If there were no constraints, an optimal equating study would have new ASVAB forms and the reference test (ASVAB 8a) administered under conditions that closely mimic the operational testing environment. The complete battery of a new version and of the reference test would be administered to a single group of randomly selected applicants for military service. However, adding the testing time required for one additional battery at the

MEPS would cause a large number of applicants to be held over an additional day with room and board costs. It would also be costly in terms of overtime hours required for Office of Personnel Management (OPM) test administrators, and regulations limit the number of overtime hours permitted such testers. There are also fatigue and motivational concerns. Therefore, the MEPS management strongly urged the minimum testing time per applicant consistent with technically sound practice.

Consequently, an alternative design was developed to equate ASVAB Forms 11, 12, and 13 to ASVAB version 8a. This design was the most defensible, given the operational realities of time, cost, and administrative control at the MEPS. The alternative design also minimized MEPS disruption and examinee burden.

All six versions of the candidate ASVABs were constructed to be parallel; therefore, equating any one version should be tantamount to equating all versions. This permitted a two-phase equating design. One candidate version was selected for equating in the MEPS, and all six candidate versions were administered in Recruit Training Centers (RTCs). In both the MEPS and RTC samples, the reference battery, version 8a, was also administered. The RTC full-battery administration of version 8a would allow the development of equating tables for any candidate version should it be found not quite parallel. An equivalent groups design (Angoff, 1971) was used to minimize additional testing time by allowing each examinee to take only one test version (a candidate ASVAB or the reference ASVAB).

In order to further minimize additional testing time in the MEPS, partial, as opposed to full, batteries were administered. Nine partial batteries were constructed from subtests from the most central version of the candidate ASVABs and nine from the like-named subtests from ASVAB 8a. The most central of the candidate ASVAB versions was determined by selecting the set of experimental subtests having the lowest root mean square deviation (RMS) between the estimated true-score distributions of the subtests and the average of the experimental subtests (Prestwood, Vale, Massey, & Welsh, 1985). Composition of these partial batteries was determined such that all unique combinations of ASVAB subtests representing service aptitude composites and the AFQT were contained within at least one of the booklets. Table 3 gives the composition of the nine partial batteries.

Note this table was taken from Prestwood, Vale, Massey, & Welsh (1985), Table 22. Version 11a was designated the "most central" and combinations of ASVAB 11a subtests were administered in the nine separate booklets at 64 MEPS. Numbers of testing booklets provided each MEPS are indicated in the MEPCOM Operational Plan (OPLAN) in Appendix B of this paper. Each MEPS testing location received an equal number of each of the 18 test booklets. These booklets were to be administered before production testing. Booklets containing either subtests from ASVAB 11a or the ASVAB 8a were alternately distributed to applicants to assure equivalent samples. The plan called for approximately 63,000 applicants, or about 3,500 examinees per booklet.

Complete batteries of all six new versions and the ASVAB 8a were administered in 11 RTC locations to investigate parallelism--both among the new tests and with the ASVAB 8a. This design also allowed equating tables for all versions to be developed from the full battery administrations. An equivalent groups design, in which examinees were assigned to take one of the seven complete batteries, was also employed in the RTC testing. This insured equivalency of the groups. The RTC sample requirements were estimated at 14,000 total recruits, or about 2,000 examinees per booklet.

Table 3. Subtests Included in Experimental Booklets Administered in the MEPS

	Subtest									
Form	GS	AR	WK	PC	NO	CS	AS	MK	MC	EI
1	X	X						X		X
2	X		X	X	X		X		X	
3	X		X	X				X	X	
4	X						X	X	X	X
5		X	X	X	X	X	X			
6		X	X	X	X	X				
7		X			X		X		X	X
8		X				X	X		X	X
9		X				X		X	X	

It is believed that the above plan represented the best compromise between the operational realities and the technical requirements of the equating. Both linear and equipercentile equatings were planned. The next section deals with the actual equating study.

IV. PART II. CONDUCT AND RESULTS OF EQUATING STUDY

The equating design for ASVAB Forms 11/12/13 was accomplished as planned during the first 3 months of 1983 in RTCs and MEPS.

Data Editing

A series of operations to check the quality of the data were performed prior to actual analyses and equatings. The data editing was accomplished in order to assure that the test booklets and forms were properly identified and that the data were appropriate for equating. The first step in the editing process verified the form number recorded by the examinee and corrected miscoded form numbers. In the second step, item response information was edited using likelihood ratios to eliminate suspect cases. The editing operations were the same for both MEPS and RTC data. Cases in the samples were rejected if (a) too few items were answered in any subtest, (b) improbable response strings or patterns were observed, and (c) the recorded answers matched other keys substantially better than that of the coded form number, or (d) the scores on some of the subtests

deviated substantially from predicted scores based on the regression of all other subtests (in order to detect nonstandard administrations). A detailed description of the data editing procedures is presented in Prestwood, Vale, Massey, and Welsh (1985).

Military Entrance Processing Stations Data

A total of 78,182 tests were administered to applicants for the military services in the MEPS. For the MEPS sample, nine experimental partial batteries and nine similarily composed booklets with ASVAB 8a subtests were administered. Table 4 provides a summary of the MEPS results of the editing procedures. About 98% of the MEPS sample (76,545) was usable.

Table 4. Results of Data Editing in the MEPS

Category	Number	Percent of Total
Good Cases	76,545	97.91
Form-number problems	376	.48
Too few responses	416	.53
Key mismatches	179	.23
Patterned responses	107	.14
Deviant scores	559	.71
Total	78,182	100.00

Note this table was taken from Prestwood, Vale, Massey, & Welsh (1985), Table 24.

Recruit Training Center Data

A total of 14,791 recruits were tested in the RTCs. Experimental and reference test booklets were assigned three-digit form numbers that used modular arithmetic so that each three-digit form number was a triply redundant index of the test version. Thus, the first digit of each form number was the same as the assigned index number; the second number was the index number plus four, modulo ten; and the third number was the index number plus ten, modulo ten. This was done in order to recover as much examinee-miscoded information as possible. Table 5 gives the form numbers assigned for RTC testing. Results of the editing of RTC data are shown in Table 6. About 97% of the 14,791 recruits tested in the RTCs provided usable data for the equating.

Table 5. Form Numbers Assigned to Booklets Used in the RTCs

Version	Form Number
11a	RTC 158
11b	RTC 269
12a	RTC 370
12b	RTC 481
13a	RTC 592
13b	RTC 603
8a	RTC 714

Table 6. Results of Data Editing in the RTCs

Category	Number	Percent of Total
Good Cases	14,325	96.85
Form-number problems	360	2.43
Too few responses	62	.42
Key mismatches	10	.07
Patterned responses	17	.11
Deviant scores	17	.11
Total	14,791	99.99[a]

[a]Total percentage does not equal 100.00 due to rounding.

Note this table was taken from Prestwood, Vale, Massey, & Welsh (1985), Table 20.

Demographics

Demographic data collected in the MEPS and RTCs were examined in order to detect any anomalous variation that might cast doubt on the equivalency of the groups. Table 7 shows the demographic characteristics of examinees tested in the MEPS. Each of the 18 test forms was administered to approximately 4,000 examinees. The demographic characteristics of this sample appeared representative of the applicants at the MEPS. Table 8 shows the demographic characteristics of the examinee samples in the RTCs. Most of the approximately 2,000 examinees taking each form had at least a high school diploma consistent with known characteristics of armed services accessions. The data in Table 8 indicate only minor sampling fluctuation between groups for each of the seven complete batteries administered in the RTCs.

Table 7. Demographic Summary for MEPS Samples (In Percentages)

Characteristic	Configuration 1	2	3	4	5	6	7	8	9
Experimental Subtests (ASVAB Form 11a)									
Sex									
Male	84	84	83	82	83	83	84	84	83
Female	15	16	16	17	17	16	16	16	17
Omit/Miscoded	01	01	01	01	01	01	01	01	01
Population Group									
American Indian	01	01	01	01	01	01	00	01	01
Spanish American	05	06	05	05	05	05	04	06	04
Asian	00	01	01	01	01	01	01	01	01
Black	23	22	23	25	23	26	25	23	27
White	68	68	69	66	69	66	67	67	66
Other	01	01	01	01	01	01	01	01	01
Omit/Miscoded	02	01	01	01	01	01	00	01	01
Testing Site									
MEPS	20	21	22	25	25	25	23	30	35
MET	27	26	22	25	27	24	30	23	22
OPM	52	50	53	49	46	48	45	42	40
Omit/Miscoded	01	02	03	02	02	03	03	06	03
Number of Subjects	4431	4520	4304	4278	4127	4286	4265	4496	4510
Reference Subtests (ASVAB 8a)									
Sex									
Male	84	83	83	82	83	84	84	84	84
Female	15	16	17	17	17	16	15	16	16
Omit/Miscoded	01	01	00	01	00	01	01	00	01
Population Group									
American Indian	01	01	01	01	01	01	01	01	01
Spanish American	05	06	04	05	05	04	04	06	04
Asian	01	01	01	01	01	01	01	02	01
Black	23	23	23	25	21	24	23	24	27
White	69	68	69	65	71	68	69	66	65
Other	01	01	01	01	01	01	01	01	01
Omit/Miscoded	01	01	01	01	01	01	01	01	01
Testing Site									
MEPS	19	22	22	24	23	22	22	28	34
MET	28	27	22	26	27	25	30	24	23
OPM	52	51	53	49	48	50	45	42	40
Omit/Miscoded	01	02	03	02	02	04	03	06	03
Number of Subjects	4173	4254	4154	4117	3975	4073	4132	4267	4183

Note. Due to rounding, percentages may not add to 100.

Table 8. Demographic Summary for RTC Samples (In Percentages)

Characteristic	RTC Form Number						
	158	269	370	481	592	603	714
Sex							
Male	83	83	83	83	83	83	83
Female	17	17	17	17	17	17	17
Omit/Miscoded	00	00	00	00	00	00	00
Population Group							
American Indian	01	01	01	01	01	01	01
Spanish American	04	05	04	04	04	05	05
Asian	01	01	01	01	01	01	01
Black	18	18	18	17	18	18	17
White	74	73	74	75	75	73	75
Other	02	01	01	01	01	02	02
Omit/Miscoded	01	01	00	01	01	00	00
Education Level							
8 or less	00	00	00	00	00	00	00
9	02	02	01	02	02	02	01
10	03	03	04	03	03	03	04
11	03	03	03	03	03	03	03
12	14	14	13	13	14	13	14
GED	06	05	06	04	05	05	05
HS	34	34	36	34	34	34	35
13+	15	15	16	15	14	16	16
Omit/Miscoded	23	24	22	25	24	24	22
Testing Site							
Air Force							
Lackland AFB	16	16	16	16	15	15	15
Army							
Ft. Bliss	03	03	03	03	03	03	03
Ft. Dix	06	07	07	07	07	07	07
Ft. Jackson	18	17	17	17	17	18	17
Ft. Knox	08	07	08	07	08	08	08
Ft. Leonard Wood	06	06	06	07	06	07	07
Ft. McClellan	03	03	03	03	03	03	03
Ft. Sill	03	03	03	03	03	03	03
Marine							
Paris Island	07	07	06	07	07	07	07
San Diego	06	06	06	07	06	06	06
Navy							
Great Lakes	09	08	09	09	09	08	09
Orlando	07	07	07	07	07	07	07
San Diego	07	07	07	07	07	07	07
Omit/Miscoded	02	02	01	01	02	02	02
Number of Subjects	2055	2064	2040	2056	2050	2033	2027

Note. Due to rounding, percentages may not add to 100.

As a check on the parallelism of the new ASVABs, summary score statistics were computed for each subtest given in the MEPS and in the RTCs. The mean, standard deviation, skewness, kurtosis, median, minimum, and maximum values were computed. For the power tests administered in the RTCs, the reliabilities (KR-20) and standard errors of measurement were also computed. The specific results of these analyses are detailed in Prestwood, Vale, Massey, and Welsh (1985). The overall conclusion, based on the descriptive statistics, was that five of the candidate forms were statistically parallel and one was not. The implications of this development are dealt with in the next part of this paper, on equatings of each of the experimental versions to the reference test.

V. PART III. EQUATING AND TABLE DEVELOPMENT

Both linear and equipercentile equatings were accomplished. Linear equating of tests is done by setting raw scores with common standard scores or z-scores, on the two tests, equal. Thus, a raw score on one test is equivalent to the raw score on the other test that shares a common z-score (Angoff, 1971, pp. 568-573). A necessary condition for linear equating is that the distributions of both tests are similar in shape.

Equipercentile equating is done by setting raw scores on two tests equal if they have the same percentile rank in the samples on which equating is done (Angoff, 1971, pp. 568-573).

Linear equating, by the nature of the transformation, always produces a smooth equating line, but the equipercentile procedure occasionally produces a jagged equating curve. Therefore, equipercentile equating transformations are usually smoothed. Smoothing of equipercentile equating in this study was accomplished by using cubic polynomial regression (Ree et al., 1985). In this procedure, the candidate test score was treated as the independent variable and the reference test score was treated as the dependent variable. The first, second, and third powers of the independent variable (i.e., the candidate test score) were entered as independent variables into a multiple regression equation and were fit to the old test scores. Since it is possible that the cubic regression can produce an undesirable non-monotonic equating curve, monotonicity was forced in the resulting equating table. This was done by starting near the middle of each equating curve and, going up toward higher scores, refusing to allow the score level to fall. Similarly, when going down from the middle toward lower scores, the score level was not allowed to rise.

A final problem encountered in equipercentile equating is the difficulty in developing an equating curve at the tails of the score distribution if no or few cases are observed. For example, if no scores are observed below a raw score of 5 on a given test, it is impossible, using the definitional form of the equipercentile procedure, to equate scores below 5. In this effort, scores beyond the distribution of available data were equated in the following manner: The upper and lower scores that could be equated using the equipercentile procedures were determined, as were scores one third of the range down from the top score and one third of the range up from the bottom score. Linear extrapolations to the tails of the distributions were made using these scores.

These procedures were used to equate 10 raw-score subtests, two raw-score composites (AFQT and VE), and 14 unique standard-score composites from Table 2 for all six candidate versions. The raw-score composites were simple sums of other raw scores. Thus, for the purpose of equating, the two raw-score composites (AFQT and VE) were computed directly from the raw subtest scores prior to equating and were then equated in the same manner as any other raw test score. Table 9 shows the transformations used to compute standard scores from raw scores for each subtest. Means and standard deviations in these transformation values were determined in the weighted 1980 Youth Population sample. The standard-score composites were computed from subtest standard scores in a manner described below. These composites of standard scores were then equated. Table 2 shows the composition of the composites that were equated in this study.

Table 9. Standardizing Transformations

Subtest	Transformation*
General Science	[(10/5.010) (Score - 15.950)] + 50
Arithmetic Reasoning	[(10/7.373) (Score - 18.009)] + 50
Word Knowledge	[(10/7.710) (Score - 26.270)] + 50
Paragraph Comprehension	[(10/3.355) (Score - 11.011)] + 50
Numerical Operations	[(10/10.985) (Score - 34.498)] + 50
Coding Speed	[(10/16.247) (Score - 46.254)] + 50
Auto-Shop Information	[(10/5.550) (Score - 14.317)] + 50
Mathematics Knowledge	[(10/6.393) (Score - 13.578)] + 50
Mechanical Comprehension	[(10/5.349) (Score - 14.165)] + 50
Electronics Information	[(10/4.236) (Score - 11.569)] + 50
Verbal Composite (VE)	[(10/10.595) (Score - 37.281)] + 50

*Values of these transformations are based on the 1980 Youth Population, ages 18-23.

Note. This table was taken from Prestwood, Vale, Massey, and Welsh (1985), Table 56.

Equating Data

The 10 subtest scores and 2 raw-score composites were equated in the MEPS and in the RTCs using linear and smoothed equipercentile procedures. One linear and one smoothed equipercentile table was developed for each of the 12 scores on each of the six candidate tests for the RTC data and for the one ASVAB version used in the MEPS. In addition to each of these individual tables, an average table was developed by taking the mean of the entries in each of the six tables from the RTC data.

Standard-score subtest equating tables were developed by applying the standardizing transformations shown in Table 9 to the raw-score equating entries in each of the seven tables. Standard scores were computed only for the 10 subtest scores and the Verbal Composite (VE). No standard scores were computed for the AFQT composite because it uses a raw-score-to-percentile conversion.

Final equating tables for the subtest raw scores were developed by rounding the standardized scores to the nearest integer number. This rounding was done after the standardized scores had been converted from raw scores.

MEPS Tables

The most central experimental version (ASVAB 11a) was equated to the reference test (ASVAB 8a) in the MEPS using nine different booklets for the most central version and nine for the reference battery. Each booklet contained subtests necessary to compute at least one service-specific composite.

To accomplish the raw-score equatings, data from all of the experimental or ASVAB 8a versions administered in the MEPS were pooled so that all examinees who took a given subtest were included. Using these pooled samples, linear and smoothed equipercentile equating tables were developed for the 10 subtest scores and the two raw-score composites. Two sets of composite scores (linear and smoothed equipercentile) were then computed for each military composite using the appropriate standard-score equating table and the pooled sample of all examinees available for that composite.

RTC Tables

Individual version and average tables were constructed for composite scores, using both linear and smoothed equipercentile procedures for subtest and composite scores. The composite scores were calculated by applying the like-named subtest standardized equating tables to the raw subtest scores. For example, to construct the linear, individual-form, composite equating tables for RTC 158 (ASVAB 11a), the composite scores were computed by summing the standardized equated scores based on the final linear equating table for the RTC 158 subtests. To construct the average equipercentile composite equating tables, the composite scores were computed by summing the standardized equated scores based on the final average equipercentile equating tables for the subtests across all versions. Thus, for each one of the composites, 14 equating tables were developed using the RTC data. Six individual tables and one average table were developed using the linear procedure, and six individual and one average table were developed using the equipercentile procedure.

Graphic Representation of Equatings

Appendix C contains the graphic representations of the equatings compared in this study. These graphs show the raw equipercentile, smoothed equipercentile, and linear equatings of raw scores of version 11a to the like-named reference subtests in ASVAB 8a for MEPS data. The same equatings are shown for RTC 370 (ASVAB 12a) based on the RTC data. Caution should be exercised when examining the graphs of the equatings. In particular, the scale for the various subtests change as a function of the length of the subtest, but the length of the axes do not. This constraint is due to page size and is a problem in all graphic interpretations. In short, differences in the equating methods may appear to be accentuated for short subtests.

Larger differences among the three types of equating lines occur at the low end of the scale. Where the data become sparse, a vertical line has been drawn on the equating graphs. Raw frequency tables are provided in Appendix D.

Table Evaluation

Procedure. While several different types of equating methods were compared in this study, only one method of equating could be chosen for any given test version. Thus, the various equatings had to be evaluated to determine which ones were to be accepted. Three questions had to be answered before a decision could be rendered:

1. How many tables should be necessary for the six candidate versions?

2. If a single table were to be used, should it be the average RTC table or should it be the ASVAB 11a (MEPS) table?

3. Should a linear or smoothed equipercentile table be used?

No absolute data were available directly addressing these questions because there are no criteria upon which to evaluate the accuracy of empirical equatings. In the absence of desired criteria, relative information was used. Thus, instead of determining the absolute accuracy of the tables, the differences among the tables were considered; if two different types of tables produced essentially equivalent results, the administratively more convenient of the two would be the table of choice. In order to address the above questions, a series of table comparisons were undertaken.

Equating tables were compared using three deviation measures computed on raw scores, both weighted and unweighted. Bias was computed as the average of the differences between corresponding entries in two equating tables. The absolute average deviation (AAD) was computed as the average of the absolute differences between corresponding entries in the two tables. RMS was computed as the square root of the average of the squared differences between corresponding entries in the two tables. These three deviation measures were computed first by equally weighting all of the entries in the tables and were computed again by weighting the entries by the score frequencies of the examinees.

First, the six individual tables computed using the RTC data were compared to the average of these tables. This comparison was done to determine if an average table could be substituted for the six individual tables, thus providing part of the information necessary to address the first question. The score frequencies for each of the individual tables were used in computing the weighted deviation measures.

Second, the ASVAB 8a tables were compared to the average RTC tables. These comparisons demonstrated how different the new tests were from the reference battery in order to further examine the efficacy of using a single conversion table. The total sample of RTC examinees was used to provide weights for the weighted deviation measures.

Third, the ASVAB Form 11a MEPS tables were compared to the 11a RTC tables, the average RTC tables, and the ASVAB 8a tables. These comparisons were done to determine how the MEPS table differed from the RTC tables for candidate and reference tests and to provide information as to which tables to use--MEPS or RTC. The MEPS sample provided the frequencies for the weighted statistics in all three of these comparisons.

Finally, deviation measures for linear and equipercentile equatings were compared to address the question as to which type of equating would best serve the needs of the testing system.

Results. Table A-1 (Appendix A) shows the deviations for subtests and raw-score composites resulting from linear equating. The first six sets show the deviations of the tables for the individual versions from the average RTC table. The average bias for the subtests and raw-score composites was smallest for the deviations between RTC 158 (ASVAB 11a), the version identified as most central on the basis of pretest information, and the average RTC table. The AAD and RMS were, however, smallest when the RTC 603 (ASVAB 13b) table was compared to the average table. The weighted AAD and weighted RMS statistics were also smallest for RTC 603. The weighted bias was smallest for RTC 481 (ASVAB 11b). When the new versions were compared to the average table, these deviations were uniformly highest for RTC 370 (ASVAB 12a). The largest deviations for the AFQT scores were found when the RTC 370 (ASVAB 12a) table was compared to the average RTC table. The absolute value of bias, for instance, was 55 percent higher than the next higher value for an individual AFQT table compared to the average AFQT table.

Table A-2 (Appendix A) shows the deviation measures for the subtests and raw-score composites resulting from smoothed equipercentile equating. When the average deviations were compared for tables based on the six individual versions and the average RTC table, the average deviations for the RTC 370 (ASVAB 12a) were generally largest. The unweighted deviation measures for the individual AFQT tables, when compared to the average AFQT tables, were higher for equipercentile equating than for linear equating. The weighted deviation measures for the AFQT composite were remarkably similar for both the linear and equipercentile table comparisons. The average weighted deviation measures comparing the ASVAB 8a table and the average RTC table were about the same as for the linear equating, but the unweighted statistics were slightly higher for the linear tables. The unweighted deviation measures for the AFQT composite were smaller for the comparison of the MEPS table with the average RTC table than for the comparison of the MEPS (ASVAB 11a) table with the same version (ASVAB 11a) administered in the RTCs. Just the opposite was true for the weighted deviation measures.

Table A-3 (Appendix A) shows the deviation measures for the standard-score composites resulting from the linear equating procedure. As might be expected, because the subtests were equated prior to forming the composites, the average bias indices were lower than for the individual subtests. The average deviations between the tables based on the individual versions and the average RTC table were more uniform across the versions than were the average deviations of the subtests.

Table A-4 (Appendix A) shows the deviation measures for the smoothed equipercentile equating tables for the standard-score composites. The average deviations were generally higher than those observed for the linear equating tables. The average bias between the RTC 370 (ASVAB 12a) table and the average RTC table was much higher than the same figure for the linear equating tables. The difference was due primarily to the large biases for three composites--ARSC, AROF, and MCCO. These large biases do not show up in the analyses of the linear tables.

Summary. The Joint Services Selection and Classification Working Group (JSSCWG) met in April of 1983 to consider the results of the equatings. Based on the results of the comparison just described, version 12a was considered to be less parallel than were the other forms. This is evident from the deviation measures for linear equating in Table 10. The difference was particularly large for the AFQT composite. The JSSCWG determined that the optimal tables for operational use with Form 12a were the tables developed based on the RTC 370 data.

Table 10. Speeded Subtest Comparisons

Test	Answer Sheet Group				
	NORC		Operational		
	Mean	SD	Mean	SD	F Ratio[a]
Numerical Operations	32.639	8.748	35.829	8.889	281.17*
Coding Speed	45.594	12.211	46.930	12.582	24.95*

[a]Degrees of freedom are 1 and 8596. Type 1 error rate was set at .01. F ratios significant at this level are indicated by an asterisk.

The JSSCWG concluded that linear equating tables would be used. Comparisons between the linear and smoothed equipercentile comparisons showed little difference between the two methods (Figures C-1 through C-24 in Appendix C). The linear tables were chosen because they were less likely to have been spuriously affected by sample-specific error. The graphs presented in Figures C-25 through C-36 (Appendix C) show the trivial differences among the subtest equatings in the RTCs and the MEPS. Versions 11a, 11b, 12b, 13a, and 13b were sufficiently parallel for the same equating table to be used for all five versions in operational testing. Tables chosen for this purpose were the tables constructed from the experimental subtests administered in the MEPS based on ASVAB 11a. These tables were chosen, rather than average RTC tables, because they were based on a large, unrestricted sample of examinees in the population of interest.

The JSSCWG concluded that the new forms of the ASVAB (Forms 11/12/13) could be implemented (with the tables discussed above) on 1 October 1983. Approximately 1 month later, the Center for Naval Analysis published a report documenting relatively large and consistent mean differences between the performance of the subjects in the 1980 Youth Population and military

applicants/recruits on the two speeded subtests of the ASVAB: Coding Speed and Numerical Operations (Sims & Maier, 1983). The next part of this paper deals with the nature and resolution of the issue raised by Sims and Maier concerning the speeded subtests.

VI. PART IV. ISSUES SURROUNDING THE SPEEDED SUBTESTS

The Issue

Sims and Maier (1983) compared the test performance of males in the 18- through 23-year-old segment of the American youth sample to the results obtained from several samples of male military applicants and recruits at different aptitude levels. These comparisons revealed that the males of the 1980 Youth Population and a sample of male military applicants differed only trivially on the eight power subtests of ASVAB 8a. There were notable differences, however, in both the Numerical Operations (NO) and Coding Speed (CS) subtests (both speeded tests). The differences were such that, at each aptitude level, scores for those in the 1980 Youth Population were consistently lower than scores for those tested in military testing environments. The differences, after controlling for aptitude, were estimated at about three raw-score points on NO and one-raw score point on CS. Sims and Maier (1983) concluded that if the 1980 Youth Population were used as the reference for the new ASVABs, with the proposed tables, the speeded subtest scores of persons tested under military conditions would be inflated. The projected amount of inflation ranged from about 4 percentile points for the AFQT (which contains half-weighted NO), to about 13 percentile points on the Air Force Administrative composite.

Definition of Issue

After Sims and Maier (1983) published their paper, a preliminary review of the testing procedures used in both the Youth Aptitude Profile study and the military testing environment led to three plausible hypotheses for the differences found in the speeded subtest performance of the two groups. The first hypothesis was that the differences found in the subtests reflected inherent aptitude differences between civilian samples and military samples. The second hypothesis, developed after careful consideration of the test materials used in the Youth Aptitude Profile study, was that the answer sheets used in the Profile study varied enough from the operational ASVAB answer sheets (DOD 1304.12-C) to account for the differences in speeded subtest performance. Finally, it was hypothesized that other administrative differences in the Youth Aptitude Profile study versus military testing environments (e.g., time of day tested, subject motivation) were the sources of differential subtest performance.

Investigation (Earles et al., 1983) revealed that variations in the type of answer sheets used by the two groups could account for almost all of the differences in speeded subtest performance observed by Sims and Maier (1983). Earles et al. (1983) based this conclusion on the results of a pilot study of approximately 500 Air Force recruits conducted during the summer of 1983. The results of the pilot study further suggested that adjustments could be made to the normative tables to equalize the effects associated with the use of nonoperational answer sheets in the Youth Aptitude Profile study. Because this pilot study was conducted on a small

and highly restricted sample, a more comprehensive study was undertaken to provide more complete information about the magnitude of the answer sheet differences and to provide more stable estimates of any adjustments to the normative data.

Approximately 9,400 applicants for military service were tested in October and November 1983 at 19 geographically dispersed MEPS in order to provide confirmation of the results of the pilot study and to provide stable adjustments to the 1980 reference population data. The details of the study are reported in Wegner and Ree (1985). The following paragraphs present an overview of the procedures used to correct or adjust the 1980 reference scale.

The results of the Wegner and Ree (1985) study indicated that the differences observed by Sims and Maier (1983) between military samples and the 1980 Youth Population were also found between two groups of military applicants who used different answer sheets. Table 10 provides the results of the comparisons of speeded subtests from Wegner and Ree (1985).

Issue Resolution

Because the Wegner and Ree (1985) results confirmed the findings from the pilot study, equatings were performed to adjust the normative data. For NO and CS, linear and equipercentile equatings were done to equate scores on the Youth Aptitude Profile answer sheet to scores on the operational answer sheet. Equipercentile equatings included unsmoothed and analytically smoothed (linear, quadratic, and cubic polynomial regression) variations. Constraints were imposed to insure monotonicity and to restrict equated scores to the raw test score range. The first four moments of a distribution (mean, variance, skewness, and kurtosis) were computed for the two answer sheet groups on the NO and CS data, and several deviation indices (BIAS, AAD, and RMS) were computed to compare the equatings.

For NO, difference in the shapes of the distributions of the two answer sheet groups suggested that linear equating was inappropriate (Wegner & Ree, 1985). Deviation indices showed both the quadratic and cubic polynomial smoothings of the equipercentile equatings to be reasonable smoothing methods. The quadratic smoothing, however, involved fewer estimators than cubic smoothing and would be expected to yield more stable values. Thus, the method used for NO was a constrained equipercentile equating with quadratic polynomial smoothing. Comparisons of the two groups on CS revealed that the shapes of the distributions were almost identical. A linear equating was therefore selected, and scores were constrained to keep them within the range of the test.

The specified equatings resulted in real number scores designed to make performance on Youth Aptitude Profile answer sheets comparable with performance on operational answer sheets. These scores were rounded to integers to make them appropriate for operational use. Table 11 shows the raw-score conversions for equating NO and CS scores on Youth Aptitude Profile answer sheets to scores on operational answer sheets.

Table 11. Conversion of NORC Scores to Operational Scores for NO and CS

NORC Raw Score	NO[a] (n=4,299)	CS[a] (n = 4,299)	NORC Raw Score	NO[a] (n = 4,299)	CS[a] (n = 4,299)
0	0	0	42	45	43
1	0	1	43	46	44
2	1	2	44	47	45
3	2	3	45	48	46
4	4	4	46	49	47
5	5	5	47	49	48
6	6	6	48	50	49
7	8	7	49	50	50
8	9	8	50	50	51
9	10	9	51		53
10	11	10	52		54
11	12	11	53		55
12	14	12	54		56
13	15	13	55		57
14	16	14	56		58
15	17	15	57		59
16	18	16	58		60
17	19	17	59		61
18	21	18	60		62
19	22	20	61		63
20	23	21	62		64
21	24	22	63		65
22	25	23	64		66
23	26	24	65		67
24	27	25	66		68
25	28	26	67		69
26	29	27	68		70
27	30	28	69		71
28	31	29	70		72
29	33	30	71		73
30	34	31	72		74
31	35	32	73		75
32	36	33	74		76
33	37	34	75		77
34	38	35	76		78
35	39	36	77		79
36	39	37	78		80
37	40	38	79		81
38	41	39	80		82
39	42	40	81		83
40	43	41	82		84
41	44	42	83		84
			84		84

Note. This table was taken from Wegner and Ree (1985), Table 5.

[a]After adjustment from equating.

In order to determine if adjustments corrected the observed differences, a series of linear model analyses was conducted. Results of these analyses indicated that the adjustments reduced score differences throughout the ability range to insignificant amounts. More detailed presentation of these analyses may be found in Wegner and Ree (1985).

Final ASVAB 8a Normative Tables

The NO and CS raw subtest scores for the 1980 Youth Population sample were replaced with integer values from the adjusted NO and CS tables. The new means and standard deviations of NO and CS were computed for the reference group--the weighted 1980 Youth Population, ages 18 through 23. The resulting means and standard deviations were adopted for use in converting ASVAB version 8a raw scores on NO and CS to standard scores (Mean = 50, SD = 10) in the 1980 score scale. 1980 norms for all ASVAB 8a composites using NO and CS were recomputed with adjusted raw scores for the AFQT and the adjusted standard scores in the SSSs for service composites.

Final ASVAB 11/12/13 Conversion Tables

A process involving three steps was required to convert Form 11/12/13 raw scores to 1980 service-specific operational scores. First, each ASVAB 8a subtest raw score had an associated standard score computed in the normative population, the 1980 American youth. The subtest raw scores from each of six new versions were equated to three like-named ASVAB 8a raw scores. Second, the subtest raw scores on the new versions (11/12/13) were "assigned" the associated ASVAB 8a standard score that corresponded to the ASVAB 8a raw score. Finally, in order to convert scores in the metric appropriate for each service, the standard scores were summed and given corresponding service-metric-specific values. This last step involved going from the sum of standard scores to the operational metrics of each of the services expressed in the 1980 Youth Population. This process was not necessary for the AFQT scores as they do not use standard scores, but instead convert directly from raw scores to percentile scores.

Finally, in order to create service specific scores, the standard scores were summed and given service-specific operational values in the 1980 Youth Population. This involved going from the sum of standard scores to the operational metrics of each of the services expressed in the 1980 Youth Population (e.g., percentiles for Air Force, and standard scores for Army, Navy, and Marine Corps).

In the first step, linear equatings were used to convert raw scores from the new versions to version 8a raw scores. The five most parallel versions (11a/11b/12b/13a/13b) were linearly equated using data collected from the MEPS sample in which 11a was equated to 8a. Version 12a was linearly equated in raw score form to 8a using data collected from the RTC sample in which 12a was equated to 8a. In all of these equatings, operational answer sheets were used. The raw score equatings are therefore totally independent of the speeded subtest issue.

The next two steps were affected by the adjustments to the speeded subtests. The changes in the means and standard deviations of NO and CS in the normative population (based on 8a) that resulted from differences in the answer sheets changed the NO and CS standard scores. Thus, SSS composite scores containing NO and CS changed, as well as the raw score composite values for AFQT (which contains half-weighted NO). The new, adjusted cumulative proportion of 1980 American youth (ages 18-23) scores on ASVAB 8a are provided in Table I-2 (Appendix I).

With composite SSSs and AFQT scores expressed in terms of the scores of ASVAB 8a, the adjustments to the speeded subtests now affected transfer of Forms 11/12/13 scores to 1980 metric values in the same way any 8a scores were affected (see Appendix E, Final 8a Normative Tables and Final Composite Tables). The speeded subtest adjustments therefore affected the norm tables, but not the raw score equatings.

VII. CONCLUSIONS

1. The design for equating ASVAB 11/12/13, which was approved by the DAC, was executed without deviation from the planned procedures.

2. Five of the six candidate ASVABs were parallel; ASVAB 12a was not.

3. Linear equating is desirable for Forms 11/12/13.

4. MEPS data are appropriate for equating the five parallel forms, and RTC data are appropriate for equating version 12a.

5. The normative population scores have been corrected to make them appropriate for use in the DOD testing programs.

Empirical verification of these conclusions is based on an Initial Operational Test and Evaluation (IOT&E) of the conversion tables for Forms 11/12/13 (at Appendixes E, F, and G). The IOT&E takes place in the MEPS approximately 2 weeks after the implementation of the new test.

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APPENDIX A: RAW/COMPOSITE SCORE DEVIATION ANALYSES FOR LINEAR AND EQUIPERCENTILE EQUATING TABLES

TABLE A-1. Raw-Score Deviation Analyses for Linear Equating Tables

	Score												
	GS	AR	WK	PC	NO	CS	AS	MK	MC	EI	VE	AFQT	Average
Deviation of RTC 158 Table from Average RTC Table													
Bias	-0.056	0.041	0.122	0.311	-0.726	0.214	-0.497	-0.188	-0.291	1.003	0.207	-0.019	0.010
AAD	0.056	0.315	0.190	0.360	0.735	0.214	0.497	0.262	0.291	1.003	0.255	0.387	0.380
RMS	0.062	0.374	0.228	0.427	0.790	0.216	0.499	0.318	0.310	1.022	0.313	0.447	0.486
Wt-Bias	-0.072	-0.108	-0.052	0.185	-0.519	0.220	-0.470	-0.163	-0.284	0.936	0.007	-0.355	-0.056
Wt-AAD	0.072	0.270	0.111	0.186	0.539	0.220	0.470	0.212	0.284	0.936	0.119	0.372	0.316
Wt-RMS	0.074	0.320	0.129	0.256	0.580	0.220	0.471	0.251	0.291	0.945	0.146	0.423	0.412
Deviation of RTC 269 Table from Average RTC Table													
Bias	0.342	0.443	-0.415	0.847	-1.394	-0.045	-0.141	-0.274	-0.524	0.454	-0.010	-0.335	-0.088
AAD	0.346	0.463	0.435	0.847	1.394	0.177	0.141	0.274	0.524	0.454	0.130	0.335	0.460
RMS	0.413	0.567	0.524	0.897	1.415	0.206	0.150	0.303	0.539	0.486	0.151	0.375	0.607
Wt-Bias	0.204	0.334	-0.124	0.732	-1.471	-0.090	-0.115	-0.260	-0.574	0.388	0.119	-0.463	-0.110
Wt-AAD	0.207	0.355	0.172	0.732	1.471	0.121	0.115	0.260	0.574	0.388	0.133	0.463	0.416
Wt-RMS	0.250	0.434	0.232	0.753	1.490	0.149	0.120	0.278	0.574	0.405	0.150	0.471	0.573
Deviation of RTC 370 Table from Average RTC Table													
Bias	-0.215	0.003	0.134	1.743	1.385	0.207	0.891	0.242	0.386	-0.595	0.551	1.340	0.506
AAD	0.475	0.087	0.142	1.743	1.385	0.207	0.891	0.382	0.445	0.595	0.551	1.340	0.697
RMS	0.561	0.105	0.169	1.809	1.421	0.220	0.916	0.460	0.555	0.604	0.560	1.366	0.894
Wt-Bias	0.100	0.048	0.224	1.469	1.484	0.192	0.797	0.217	0.286	-0.643	0.606	1.529	0.526
Wt-AAD	0.269	0.073	0.224	1.469	1.484	0.192	0.797	0.319	0.335	0.643	0.606	1.529	0.662
Wt-RMS	0.323	0.088	0.231	1.521	1.515	0.197	0.811	0.378	0.416	0.647	0.607	1.535	0.663
Deviation of RTC 481 Table from Average RTC Table													
Bias	-0.284	0.045	0.249	-1.676	0.660	0.099	0.718	0.450	0.573	-0.707	-0.370	-0.010	-0.021
AAD	0.388	0.180	0.291	1.676	0.660	0.099	0.718	0.719	0.573	0.707	0.370	0.111	0.541
RMS	0.471	0.212	0.355	1.795	0.671	0.116	0.734	0.865	0.628	0.710	0.375	0.128	0.731
Wt-Bias	-0.052	-0.030	0.022	-1.284	0.647	0.086	0.648	0.418	0.542	-0.681	-0.384	-0.107	-0.015
Wt-AAD	0.189	0.141	0.124	1.284	0.647	0.086	0.648	0.624	0.542	0.681	0.384	0.112	0.455
Wt-RMS	0.231	0.168	0.158	1.348	0.655	0.093	0.657	0.733	0.570	0.682	0.385	0.125	0.598
Deviation of RTC 592 Table from Average RTC Table													
Bias	-0.148	-0.385	0.164	-0.889	-0.303	-0.165	-0.782	-0.264	-0.450	-0.337	-0.147	-0.864	-0.381
AAD	0.148	0.536	0.164	0.901	0.314	0.357	0.782	0.453	0.450	0.352	0.195	0.960	0.468
RMS	0.153	0.663	0.175	1.079	0.322	0.421	0.785	0.542	0.504	0.428	0.239	1.174	0.627
Wt-Bias	-0.173	-0.194	0.216	-0.449	-0.240	-0.080	-0.741	-0.216	-0.418	-0.224	0.012	-0.272	-0.232
Wt-AAD	0.173	0.373	0.216	0.472	0.271	0.186	0.741	0.350	0.418	0.232	0.095	0.373	0.325
Wt-RMS	0.174	0.451	0.218	0.605	0.277	0.236	0.742	0.407	0.442	0.282	0.116	0.476	0.410

TABLE A-1. (Concluded)

	Score												
	GS	AR	WK	PC	NO	CS	AS	MK	MC	EI	VE	AFQT	Average
Deviation of RTC 603 Table from Average RTC Table													
Bias	0.361	-0.147	-0.254	-0.335	0.377	-0.309	-0.189	0.033	0.306	0.183	-0.231	-0.111	-0.026
AAD	0.581	0.257	0.254	0.335	0.388	0.309	0.220	0.235	0.400	0.195	0.232	0.287	0.309
RMS	0.699	0.329	0.256	0.387	0.472	0.319	0.270	0.272	0.495	0.237	0.275	0.337	0.384
Wt-Bias	-0.007	-0.034	-0.285	-0.489	0.196	-0.327	-0.090	0.054	0.460	0.243	-0.367	-0.352	-0.093
Wt-AAD	0.319	0.179	0.285	0.489	0.209	0.327	0.129	0.169	0.472	0.243	0.367	0.357	0.256
Wt-RMS	0.386	0.219	0.286	0.510	0.260	0.330	0.162	0.207	0.538	0.262	0.378	0.388	0.346
Deviation of 8a from Average RTC Table (RTC frequencies used for weights)													
Bias	-0.601	1.439	-1.982	-0.529	-0.934	0.033	-0.509	-0.318	1.282	-0.238	-1.617	-1.310	-0.440
AAD	1.306	1.439	2.000	0.760	0.939	0.173	0.771	0.686	1.282	0.548	1.678	1.643	1.102
RMS	1.534	1.434	2.365	0.932	0.955	0.202	0.931	0.811	1.408	0.646	2.050	2.007	1.418
Wt-Bias	0.243	1.399	-0.924	0.039	-0.869	0.077	-0.118	-0.257	1.162	0.010	-0.672	-0.190	-0.008
Wt-AAD	0.789	1.399	0.967	0.450	0.882	0.111	0.471	0.534	1.162	0.332	0.797	0.632	0.710
Wt-RMS	0.950	1.412	1.270	0.552	0.904	0.138	0.567	0.625	1.226	0.398	1.070	0.793	0.904
Deviation of MEPS Experimental Table from 8a													
Bias	0.443	-1.432	1.993	1.405	-0.154	0.064	-0.082	0.462	-1.765	1.211	1.893	1.540	0.465
AAD	1.586	1.432	2.000	1.643	0.610	0.301	0.830	0.845	1.765	1.282	1.954	2.456	1.392
RMS	1.832	1.578	2.356	2.002	0.729	0.353	0.960	1.008	1.803	1.550	2.368	2.955	1.780
Wt-Bias	-0.401	-1.723	1.171	0.382	0.212	0.105	-0.510	0.441	-1.807	0.935	0.973	-0.088	-0.026
Wt-AAD	1.105	1.723	1.189	0.889	0.392	0.175	0.743	0.722	1.807	0.975	1.100	1.204	1.002
Wt-RMS	1.324	1.793	1.511	1.121	0.493	0.217	0.879	0.832	1.808	1.149	1.437	1.454	1.259
Deviation of MEPS Experimental Table from Average RTC Table													
Bias	-0.158	0.007	0.010	0.876	-1.088	0.097	-0.591	0.145	-0.484	0.973	0.276	0.231	0.025
AAD	0.344	0.716	0.040	0.914	1.129	0.474	0.591	0.170	0.524	0.973	0.278	0.883	0.586
RMS	0.407	0.836	0.049	1.097	1.359	0.549	0.617	0.208	0.655	1.045	0.332	1.028	0.782
Wt-Bias	-0.342	-0.315	0.045	0.394	-0.691	0.160	-0.670	0.141	-0.647	0.866	0.146	-0.417	-0.111
Wt-AAD	0.366	0.653	0.048	0.478	0.742	0.270	0.670	0.158	0.650	0.866	0.148	0.597	0.471
Wt-RMS	0.426	0.774	0.055	0.632	0.869	0.335	0.683	0.183	0.723	0.904	0.191	0.712	0.608
Deviation of MEPS Experimental Table from Same-Form RTC Table													
Bias	-0.102	-0.035	-0.112	0.564	-0.361	-0.117	-0.094	0.332	-0.193	-0.030	0.069	0.250	0.014
AAD	0.312	0.405	0.222	0.604	0.510	0.454	0.208	0.430	0.449	0.164	0.072	0.513	0.362
RMS	0.364	0.476	0.264	0.737	0.639	0.529	0.246	0.525	0.551	0.190	0.089	0.609	0.476
Wt-Bias	-0.274	-0.226	0.069	0.202	-0.107	-0.057	-0.196	0.322	-0.362	-0.083	0.112	-0.108	-0.059
Wt-AAD	0.307	0.374	0.152	0.288	0.268	0.226	0.219	0.392	0.442	0.123	0.112	0.282	0.265
Wt-RMS	0.362	0.447	0.177	0.378	0.341	0.288	0.259	0.454	0.528	0.152	0.118	0.337	0.342

Note. This table was taken from Prestwood, Vale, Massey, and Welsh (1985), Table 58.

TABLE A-2. Raw-Score Deviation Analyses for Equipercentile Equating Tables

	Score											
	CS	AR	WK	PC	MO	CS	AS	MK	MC	EI	VE	AFQT	Average
Deviation of RTC 158 Table from Average RTC Table													
Bias	0.389	-0.003	0.055	0.151	-0.647	0.347	-0.223	-0.140	-0.254	0.708	0.144	-0.562	-0.028
AAD	0.507	0.325	0.141	0.315	0.647	0.347	0.472	0.228	0.290	0.723	0.159	0.362	0.421
RMS	0.785	0.366	0.169	0.370	0.743	0.383	0.512	0.263	0.315	0.820	0.250	1.203	0.534
Wt-Bias	-0.050	-0.145	-0.042	0.205	-0.544	0.233	-0.467	-0.163	-0.287	0.930	0.029	-0.341	-0.054
Wt-AAD	0.158	0.348	0.133	0.279	0.544	0.233	0.484	0.236	0.308	0.931	0.123	0.341	0.343
Wt-RMS	0.229	0.386	0.148	0.329	0.629	0.247	0.505	0.274	0.327	0.967	0.151	0.412	0.443
Deviation of RTC 269 Table from Average RTC Table													
Bias	0.355	0.303	-0.239	0.716	-0.951	-0.215	0.026	-0.208	-0.608	0.292	0.122	0.246	-0.011
AAD	0.430	0.360	0.262	0.716	1.002	0.252	0.207	0.209	0.613	0.371	0.169	0.501	0.459
RMS	0.557	0.398	0.325	0.768	1.309	0.343	0.282	0.244	0.676	0.408	0.237	1.160	0.656
Wt-Bias	0.214	0.309	-0.123	0.712	-1.530	-0.094	-0.103	-0.247	-0.583	0.387	0.113	-0.464	-0.118
Wt-AAD	0.215	0.377	0.178	0.712	1.532	0.144	0.127	0.248	0.585	0.389	0.142	0.485	0.428
Wt-RMS	0.328	0.416	0.241	0.744	1.680	0.220	0.153	0.276	0.607	0.421	0.164	0.513	0.626
Deviation of RTC 370 Table from Average RTC Table													
Bias	-0.764	-0.042	-0.001	1.060	0.991	0.231	0.926	0.271	0.275	-0.405	0.123	-0.554	0.175
AAD	1.038	0.139	0.295	1.281	1.116	0.231	0.926	0.381	0.420	0.626	0.618	2.314	0.782
RMS	1.465	0.213	0.395	1.528	1.326	0.237	0.982	0.486	0.448	0.665	0.736	2.865	1.194
Wt-Bias	0.096	0.052	0.213	1.492	1.596	0.206	0.817	0.227	0.275	-0.653	0.601	1.557	0.540
Wt-AAD	0.411	0.073	0.228	1.543	1.598	0.206	0.817	0.340	0.380	0.665	0.633	1.616	0.709
Wt-RMS	0.538	0.126	0.241	1.729	1.676	0.210	0.846	0.434	0.408	0.679	0.668	1.657	0.934
Deviation of RTC 481 Table from Average RTC Table													
Bias	-0.429	0.185	0.381	-1.123	0.696	-0.042	0.864	0.417	0.315	-0.787	0.065	1.343	0.157
AAD	0.517	0.309	0.443	1.271	0.696	0.197	0.864	0.676	0.492	0.787	0.555	1.545	0.696
RMS	0.751	0.436	0.635	1.505	0.750	0.239	0.952	0.809	0.563	0.838	0.694	2.282	1.013
Wt-Bias	-0.032	-0.036	0.032	-1.310	0.655	0.115	0.675	0.423	0.531	-0.680	-0.388	-0.121	-0.011
Wt-AAD	0.159	0.145	0.166	1.354	0.655	0.169	0.675	0.668	0.535	0.680	0.469	0.351	0.502
Wt-RMS	0.237	0.184	0.265	1.549	0.675	0.191	0.712	0.791	0.588	0.691	0.528	0.519	0.620
Deviation of RTC 592 Table from Average RTC Table													
Bias	-0.042	-0.477	-0.051	-0.706	-0.556	-0.072	-1.139	-0.334	-0.147	-0.165	-0.353	-0.924	-0.414
AAD	0.232	0.601	0.309	0.711	0.556	0.311	1.139	0.472	0.477	0.251	0.410	0.967	0.536
RMS	0.271	0.774	0.390	0.908	0.752	0.341	1.366	0.644	0.576	0.271	0.711	1.221	0.765
Wt-Bias	-0.168	-0.145	0.214	-0.419	-0.257	-0.072	-0.757	-0.205	-0.412	-0.211	0.013	-0.244	-0.222
Wt-AAD	0.182	0.325	0.254	0.432	0.257	0.215	0.757	0.336	0.428	0.261	0.100	0.333	0.323
Wt-RMS	0.190	0.432	0.285	0.648	0.313	0.256	0.802	0.442	0.491	0.278	0.195	0.500	0.441

TABLE A-2. (Concluded)

	Score												
	GS	AR	WK	PC	NO	CS	AS	MK	MC	EI	VE	AFQT	Average
Deviation of RTC 603 Table from Average RTC Table													
Bias	0.450	0.034	-0.145	-0.098	0.478	-0.248	-0.452	-0.006	0.419	0.358	-0.101	0.760	0.121
AAD	0.680	0.220	0.299	0.456	0.480	0.280	0.528	0.273	0.427	0.358	0.340	1.147	0.457
RMS	0.843	0.250	0.345	0.528	0.662	0.316	0.774	0.301	0.545	0.441	0.397	1.514	0.667
Wt-Bias	-0.013	-0.009	-0.289	-0.434	0.196	-0.389	-0.093	0.044	0.475	0.242	-0.348	-0.365	-0.092
Wt-AAD	0.362	0.184	0.295	0.497	0.200	0.390	0.205	0.240	0.482	0.242	0.360	0.524	0.332
Wt-RMS	0.442	0.207	0.308	0.558	0.315	0.401	0.295	0.272	0.582	0.277	0.367	0.592	0.405
Deviation of 8a from Average RTC Table (RTC frequencies used for weights)													
Bias	-0.407	0.997	-1.194	-0.155	-0.614	0.309	-0.358	-0.240	1.030	0.115	-0.953	-0.892	-0.197
AAD	1.100	1.089	1.233	0.424	0.847	0.367	0.605	0.572	1.059	0.391	1.055	1.212	0.830
RMS	1.206	1.257	1.366	0.510	0.928	0.595	0.696	0.649	1.173	0.466	1.308	1.431	1.050
Wt-Bias	0.250	1.336	-0.918	0.055	-0.950	0.161	-0.103	-0.246	1.162	0.014	-0.667	-0.142	0.091
Wt-AAD	0.921	1.396	0.935	0.510	0.955	0.180	0.498	0.563	1.171	0.351	0.837	0.806	0.769
Wt-RMS	1.029	1.489	1.310	0.605	1.005	0.350	0.588	0.644	1.254	0.410	1.115	0.997	0.967
Deviation of MEPS Experimental Table from 8a													
Bias	0.431	-1.133	1.282	0.540	0.169	-0.259	0.014	0.341	-1.223	0.506	1.006	0.624	0.191
AAD	1.552	1.463	1.347	0.917	0.546	0.452	0.973	0.737	1.366	0.924	1.254	1.456	1.082
RMS	1.715	1.741	1.655	1.099	0.616	0.569	1.063	0.822	1.561	1.067	1.550	1.664	1.328
Wt-Bias	-0.409	-1.725	1.162	0.335	0.307	0.021	-0.517	0.439	-1.815	0.918	0.958	-0.093	-0.034
Wt-AAD	1.257	1.765	1.302	1.095	0.528	0.271	0.894	0.752	1.816	1.108	1.322	1.292	1.117
Wt-RMS	1.408	1.934	1.575	1.221	0.609	0.333	0.982	0.845	1.891	1.221	1.558	1.466	1.344
Deviation of MEPS Experimental Table from Average RTC Table													
Bias	0.024	-0.135	0.087	0.385	-0.445	0.049	-0.345	0.101	-0.193	0.620	0.052	-0.268	-0.006
AAD	0.573	0.733	0.128	0.575	0.874	0.561	0.648	0.197	0.726	0.682	0.318	0.472	0.541
RMS	0.662	0.808	0.164	0.671	1.102	0.712	0.704	0.213	0.809	0.804	0.396	0.608	0.697
Wt-Bias	-0.357	-0.420	0.055	0.374	-0.701	0.152	-0.668	0.128	-0.659	0.867	0.154	-0.444	-0.126
Wt-AAD	0.470	0.769	0.134	0.560	0.762	0.247	0.708	0.196	0.730	0.838	0.312	0.494	0.524
Wt-RMS	0.503	0.855	0.174	0.666	0.988	0.330	0.752	0.209	0.786	0.958	0.348	0.586	0.655
Deviation of MEPS Experimental Table from Same-Form RTC Table													
Bias	-0.365	-0.132	0.033	0.234	0.202	-0.297	-0.122	0.241	0.061	-0.087	-0.091	0.594	0.023
AAD	0.365	0.421	0.169	0.296	0.585	0.586	0.196	0.418	0.680	0.134	0.313	0.836	0.417
RMS	0.409	0.468	0.204	0.348	0.792	0.643	0.237	0.460	0.834	0.200	0.452	1.167	0.609
Wt-Bias	-0.353	-0.316	0.074	0.155	-0.073	-0.070	-0.214	0.315	-0.377	-0.074	0.110	-0.105	-0.078
Wt-AAD	0.353	0.440	0.192	0.289	0.349	0.177	0.248	0.443	0.498	0.127	0.221	0.275	0.301
Wt-RMS	0.376	0.499	0.214	0.333	0.416	0.313	0.279	0.487	0.565	0.178	0.255	0.377	0.375

Note. This table was taken from Prestwood, Vale, Massey, and Welsh (1985), Table 59.

TABLE A-3. Composite-Score Deviation Analyses for Linear Equating Tables

	Composite													
	ARST	ARCH	ARSL	ARCL	ARMM	ARSC	ARCO	ARFA	AROF	ARST	MCMM	MCCO	MCFA	AFM	Average
Deviation of RTC 158 Table from Average RTC Table															
Bias	-0.075	-0.193	-0.170	-0.069	-0.049	-0.089	-0.034	-0.069	-0.040	-0.106	-0.040	-0.111	-0.102	-0.104	-0.089
AAD	0.131	0.616	0.406	0.263	0.243	0.250	0.782	0.864	0.576	0.319	0.440	0.120	0.145	0.306	0.390
RMS	0.158	0.722	0.423	0.305	0.285	0.294	0.905	0.996	0.665	0.373	0.509	0.159	0.180	0.353	0.526
Wt-Bias	-0.081	-0.115	-0.141	-0.093	-0.075	-0.112	-0.096	-0.089	-0.107	-0.127	-0.086	-0.102	-0.111	-0.135	-0.105
Wt-AAD	0.086	0.244	0.187	0.119	0.109	0.125	0.309	0.339	0.219	0.161	0.207	0.102	0.112	0.177	0.178
Wt-RMS	0.100	0.299	0.228	0.143	0.131	0.144	0.372	0.411	0.262	0.193	0.247	0.102	0.123	0.209	0.232
Deviation of RTC 269 Table from Average RTC Table															
Bias	-0.018	-0.080	-0.128	0.030	-0.045	0.042	-0.155	-0.204	0.014	-0.105	-0.076	0.050	0.003	-0.125	-0.057
AAD	0.132	0.156	0.354	0.297	0.522	0.373	0.444	0.217	0.781	0.523	0.820	0.236	0.382	0.425	0.410
RMS	0.153	0.192	0.416	0.343	0.614	0.437	0.521	0.255	0.901	0.606	0.947	0.344	0.442	0.497	0.527
Wt-Bias	-0.025	-0.050	-0.148	0.004	-0.115	0.004	-0.185	-0.200	-0.080	-0.141	-0.170	0.016	-0.036	-0.182	-0.096
Wt-AAD	0.057	0.095	0.181	0.099	0.222	0.112	0.225	0.200	0.275	0.231	0.389	0.089	0.151	0.243	0.184
Wt-RMS	0.068	0.112	0.223	0.124	0.267	0.142	0.269	0.201	0.335	0.280	0.464	0.114	0.183	0.287	0.242
Deviation of RTC 370 Table from Average RTC Table															
Bias	-0.045	-0.068	-0.089	0.013	0.130	0.003	-0.087	-0.075	-0.012	-0.140	-0.071	0.012	-0.115	-0.156	-0.050
AAD	0.256	0.135	0.476	0.702	0.630	0.079	0.865	0.608	0.093	0.196	0.170	0.110	0.197	0.707	0.373
RMS	0.293	0.170	0.556	0.811	0.730	0.146	1.000	0.704	0.150	0.239	0.217	0.169	0.251	0.821	0.536
Wt-Bias	-0.033	-0.076	-0.055	0.064	0.048	0.017	-0.158	-0.088	-0.014	-0.128	-0.080	0.034	-0.092	-0.266	-0.059
Wt-AAD	0.100	0.080	0.190	0.235	0.234	0.023	0.354	0.242	0.030	0.129	0.094	0.041	0.096	0.388	0.160
Wt-RMS	0.122	0.095	0.226	0.290	0.287	0.027	0.426	0.297	0.036	0.149	0.112	0.048	0.118	0.461	0.236
Deviation of RTC 481 Table from Average RTC Table															
Bias	-0.019	0.087	-0.016	-0.030	0.106	0.012	-0.044	0.002	0.076	-0.023	0.022	0.087	0.005	-0.015	0.018
AAD	0.158	1.291	0.500	0.290	1.126	0.526	0.798	0.321	1.096	0.597	0.868	0.849	0.560	1.295	0.735
RMS	0.221	1.486	0.577	0.339	1.296	0.607	0.923	0.370	1.263	0.678	1.002	0.978	0.648	1.495	0.941
Wt-Bias	-0.010	-0.067	-0.045	-0.011	-0.050	-0.045	-0.108	-0.002	-0.058	-0.062	-0.077	-0.030	-0.055	-0.229	-0.061
Wt-AAD	0.070	0.518	0.204	0.092	0.423	0.163	0.316	0.122	0.376	0.233	0.390	0.265	0.223	0.626	0.287
Wt-RMS	0.096	0.621	0.248	0.116	0.509	0.205	0.382	0.148	0.458	0.282	0.464	0.331	0.268	0.738	0.394
Deviation of RTC 592 Table from Average RTC Table															
Bias	0.016	-0.050	-0.003	-0.005	-0.255	-0.106	-0.194	-0.114	-0.168	-0.065	-0.193	-0.101	-0.030	-0.205	-0.105
AAD	0.249	0.496	0.014	0.191	0.649	0.706	0.205	0.523	0.283	0.325	0.212	0.722	0.198	0.209	0.355
RMS	0.289	0.578	0.085	0.220	0.771	0.821	0.260	0.608	0.359	0.377	0.275	0.838	0.245	0.265	0.490
Wt-Bias	0.003	0.015	0.001	-0.023	-0.160	-0.019	-0.187	-0.124	-0.128	-0.086	-0.175	0.009	-0.003	-0.178	-0.075
Wt-AAD	0.102	0.187	0.001	0.067	0.245	0.198	0.137	0.222	0.132	0.143	0.175	0.213	0.068	0.178	0.151
Wt-RMS	0.123	0.226	0.001	0.084	0.309	0.253	0.189	0.272	0.161	0.173	0.181	0.255	0.083	0.182	0.197

TABLE A-3. (Concluded)

	Composite													
	AFQT	ARGM	AFEL	ARCL	ARMM	AFSC	ARCO	ARFA	AROF	ARST	MCMM	MCCO	MCFA	AFM	Average
Deviation of RTC 603 Table from Average RTC Table															
Bias	0.017	0.082	0.129	0.040	-0.262	0.002	-0.330	-0.064	-0.233	-0.075	-0.303	0.020	-0.018	-0.427	-0.101
AAD	0.336	0.501	0.145	0.226	0.306	0.000	0.630	0.504	0.239	0.173	0.478	0.191	0.090	0.572	0.316
RMS	0.388	0.585	0.175	0.263	0.393	0.118	0.764	0.604	0.263	0.205	0.586	0.226	0.121	0.704	0.441
Wt-Bias	0.000	0.143	0.133	0.019	-0.223	0.010	-0.267	-0.047	-0.225	-0.063	-0.249	0.001	-0.020	-0.336	-0.080
Wt-AAD	0.136	0.225	0.138	0.075	0.223	0.010	0.294	0.178	0.225	0.079	0.263	0.057	0.035	0.344	0.163
Wt-RMS	0.165	0.271	0.141	0.096	0.242	0.010	0.363	0.218	0.225	0.098	0.321	0.071	0.042	0.416	0.225
Deviation of 8a from Average RTC Table (RTC frequencies used for weights)															
Bias	0.032	0.130	0.103	-0.058	-0.018	0.062	0.058	-0.019	-0.023	-0.037	0.086	0.057	0.118	0.216	0.051
AAD	0.053	0.147	0.117	0.516	0.029	0.428	0.936	0.073	0.037	1.025	0.589	0.285	0.575	1.170	0.431
RMS	0.081	0.185	0.151	0.600	0.137	0.496	1.001	0.183	0.148	1.184	0.682	0.332	0.668	1.358	0.664
Wt-Bias	0.031	0.127	0.103	-0.021	-0.009	0.018	-0.017	-0.013	-0.023	0.032	0.024	0.025	0.059	0.032	0.026
Wt-AAD	0.031	0.127	0.103	0.166	0.009	0.126	0.347	0.020	0.032	0.393	0.255	0.087	0.218	0.515	0.173
Wt-RMS	0.036	0.133	0.109	0.210	0.009	0.161	0.423	0.024	0.038	0.476	0.307	0.111	0.270	0.619	0.277
Deviation of MEPS Experimental Table from 8a															
Bias	0.094	-0.847	0.054	0.241	0.760	0.384	-0.290	-0.267	0.257	-0.537	0.215	0.078	-0.035	-0.705	-0.043
AAD	0.749	1.341	0.704	0.384	0.760	0.384	0.706	1.640	0.287	1.125	0.685	0.078	0.937	1.507	0.806
RMS	0.866	1.619	0.813	0.462	0.813	0.413	0.832	1.900	0.352	1.333	0.800	0.081	1.082	1.789	1.079
Wt-Bias	0.105	-0.817	0.051	0.254	0.751	0.383	-0.303	-0.206	0.269	-0.549	0.177	0.079	-0.077	-0.592	-0.034
Wt-AAD	0.327	0.858	0.300	0.257	0.751	0.383	0.359	0.632	0.269	0.633	0.318	0.079	0.388	0.789	0.453
Wt-RMS	0.399	1.012	0.355	0.295	0.759	0.386	0.429	0.772	0.284	0.758	0.390	0.080	0.464	0.989	0.592
Deviation of MEPS Experimental Table from Average RTC Table															
Bias	0.126	-0.717	0.157	0.183	0.742	0.446	-0.232	-0.286	0.234	-0.575	0.302	0.135	0.024	-0.489	0.008
AAD	0.778	1.231	0.769	0.221	0.744	0.640	1.610	1.570	0.263	0.575	1.262	0.283	1.503	0.493	0.853
RMS	0.898	1.472	0.890	0.275	0.795	0.776	1.857	1.813	0.320	0.576	1.460	0.336	1.727	0.583	1.128
Wt-Bias	0.139	-0.683	0.158	0.174	0.742	0.447	-0.246	-0.222	0.252	-0.574	0.239	0.133	0.023	-0.461	0.009
Wt-AAD	0.349	0.739	0.351	0.175	0.742	0.448	0.658	0.618	0.252	0.574	0.584	0.141	0.621	0.461	0.430
Wt-RMS	0.428	0.879	0.418	0.189	0.751	0.503	0.787	0.756	0.259	0.575	0.709	0.175	0.749	0.482	0.592
Deviation of MEPS Experimental Table from Same-Form RTC Table															
Bias	0.201	-0.525	0.327	0.252	0.791	0.535	-0.159	-0.218	0.274	-0.468	0.341	0.246	0.186	-0.385	0.097
AAD	0.679	0.648	1.171	0.467	0.791	0.544	0.842	0.712	0.749	0.475	0.854	0.330	1.406	0.606	0.734
RMS	0.792	0.799	1.363	0.557	0.791	0.651	0.978	0.831	0.878	0.568	1.004	0.404	1.623	0.737	0.909
Wt-Bias	0.212	-0.518	0.324	0.236	0.792	0.533	-0.213	-0.192	0.309	-0.465	0.295	0.236	0.125	-0.349	0.095
Wt-AAD	0.321	0.518	0.553	0.260	0.792	0.533	0.359	0.299	0.374	0.465	0.420	0.236	0.573	0.375	0.434
Wt-RMS	0.402	0.530	0.663	0.303	0.792	0.548	0.431	0.370	0.443	0.485	0.519	0.263	0.709	0.463	0.518

Note. This table was taken from Prestwood, Vale, Massey, and Welsh (1985), Table 60.

TABLE A-4. Composite-Score Deviation Analyses for Equipercentile Equating Tables

	Composite														
	ARGT	ARGM	AREL	ARCL	ARMM	ARSC	ARCO	ARFA	AROF	ARST	MCMM	MCCO	MCFA	AFM	Average
Deviation of RTC 158 Table from Average RTC Table															
Bias	0.180	-0.606	0.097	-1.014	-1.760	-1.472	-0.993	0.100	-1.528	0.129	-0.337	-1.414	0.011	-0.928	-0.651
AAD	0.246	1.335	1.135	1.059	1.768	1.580	1.037	1.065	1.538	0.637	1.170	1.506	0.165	1.007	1.089
RMS	0.367	1.964	1.525	1.733	3.047	3.007	1.832	1.397	2.374	0.839	1.538	2.419	0.256	1.332	1.878
Wt-Bias	-0.053	-0.050	-0.106	-0.047	-0.404	0.073	-0.143	-0.335	-0.252	-0.269	-0.343	0.024	0.022	-0.053	-0.138
Wt-AAD	0.094	0.122	0.216	0.171	0.404	0.212	0.189	0.366	0.266	0.305	0.367	0.214	0.025	0.261	0.230
Wt-RMS	0.118	0.238	0.272	0.277	0.529	0.350	0.290	0.384	0.410	0.324	0.434	0.356	0.039	0.356	0.335
Deviation of RTC 269 Table from Average RTC Table															
Bias	-0.576	0.210	-0.138	1.206	-0.658	1.892	-0.094	0.135	-0.191	-0.376	-0.264	0.688	-0.303	0.164	0.121
AAD	0.582	0.371	0.365	1.581	0.668	3.708	1.664	0.280	1.557	0.427	0.291	1.699	0.842	0.255	1.021
RMS	0.771	0.550	0.485	2.914	1.007	5.951	2.249	0.415	2.057	0.689	0.396	2.497	1.170	0.335	2.136
Wt-Bias	-0.127	0.041	-0.021	-0.175	-0.078	-0.141	-0.066	-0.116	-0.138	-0.085	-0.112	-0.177	-0.115	0.075	-0.038
Wt-AAD	0.143	0.052	0.197	0.293	0.108	0.401	0.270	0.188	0.243	0.165	0.163	0.258	0.129	0.204	0.201
Wt-RMS	0.206	0.085	0.219	0.540	0.196	0.814	0.344	0.216	0.352	0.199	0.200	0.418	0.213	0.228	0.352
Deviation of RTC 370 Table from Average RTC Table															
Bias	-0.347	-1.089	-0.285	-1.520	-1.575	-3.679	-0.314	-0.131	-3.079	-2.029	-0.196	-3.327	-0.889	-1.462	-1.423
AAD	0.374	1.177	0.359	1.590	1.685	3.851	1.112	0.655	3.221	2.172	0.201	3.542	0.971	2.142	1.647
RMS	0.633	1.951	0.450	2.385	2.569	5.815	1.518	0.820	5.105	2.999	0.285	4.580	1.441	3.522	2.977
Wt-Bias	0.002	-0.015	-0.048	-0.016	-0.230	0.098	-0.023	-0.047	-0.079	-0.019	-0.088	0.151	0.063	0.201	-0.004
Wt-AAD	0.071	0.250	0.191	0.263	0.465	0.522	0.350	0.296	0.508	0.438	0.089	0.677	0.182	0.505	0.343
Wt-RMS	0.126	0.312	0.225	0.452	0.573	0.832	0.396	0.332	0.805	0.620	0.104	0.927	0.242	0.678	0.540
Deviation of RTC 481 Table from Average RTC Table															
Bias	0.169	-0.298	-0.075	-0.883	-0.369	-0.348	0.253	-1.086	0.261	0.461	0.046	-0.017	0.499	0.330	-0.076
AAD	0.810	0.687	0.347	0.893	0.636	0.561	0.738	2.043	1.765	1.633	0.213	0.770	1.534	0.394	0.930
RMS	1.157	0.879	0.417	1.163	0.721	0.776	1.037	3.090	2.184	2.162	0.253	0.996	2.154	0.511	1.483
Wt-Bias	-0.122	0.025	-0.003	-0.123	-0.161	-0.195	-0.154	-0.124	-0.214	-0.093	-0.156	-0.197	-0.118	0.057	-0.113
Wt-AAD	0.173	0.477	0.225	0.160	0.473	0.264	0.191	0.302	0.445	0.353	0.215	0.521	0.248	0.198	0.303
Wt-RMS	0.249	0.549	0.251	0.262	0.532	0.314	0.225	0.425	0.590	0.524	0.242	0.598	0.387	0.260	0.411
Deviation of RTC 592 Table from Average RTC Table															
Bias	0.104	-0.107	-0.088	0.183	0.630	0.788	0.103	0.727	0.636	1.025	-0.306	0.206	-0.488	-1.345	0.133
AAD	0.421	1.238	1.281	0.793	1.254	1.001	1.713	1.011	0.964	1.367	1.156	0.514	0.543	1.703	1.068
RMS	0.499	1.638	1.708	0.936	1.613	1.415	2.197	1.289	1.192	1.752	1.402	0.733	0.658	2.907	1.551
Wt-Bias	0.009	-0.163	-0.093	-0.090	-0.385	-0.096	-0.320	-0.359	-0.340	-0.382	-0.341	-0.015	-0.031	-0.263	-0.205
Wt-AAD	0.173	0.247	0.330	0.465	0.704	0.244	0.428	0.433	0.429	0.568	0.422	0.233	0.192	0.267	0.367
Wt-RMS	0.211	0.294	0.379	0.540	0.832	0.291	0.474	0.471	0.491	0.631	0.479	0.274	0.236	0.564	0.471

TABLE A-4. (Concluded)

	Composite													
	AFGT	ARGM	AREL	ARCL	ARMM	ARSC	ARCO	ARFA	AROF	ARST	MCMM	MCCO	MCFA	AFM	Average
Deviation of RTC 603 Table from Average RTC Table															
Bias	0.172	1.599	1.323	1.410	2.261	1.557	1.004	1.070	1.411	0.991	0.290	1.595	-0.192	0.525	1.100
AAD	0.791	1.629	1.323	1.568	2.637	1.622	1.885	1.333	1.706	1.640	0.669	1.747	0.696	0.835	1.434
RMS	1.016	2.212	1.714	2.021	4.019	2.227	2.902	2.060	2.186	2.508	0.902	2.155	0.958	1.207	2.165
Wt-Bias	-0.075	0.226	0.273	-0.148	-0.301	-0.014	-0.231	-0.151	-0.379	-0.182	-0.306	-0.112	-0.056	-0.149	-0.115
Wt-AAD	0.273	0.305	0.273	0.403	0.627	0.258	0.626	0.491	0.589	0.490	0.429	0.430	0.167	0.419	0.413
Wt-RMS	0.310	0.456	0.388	0.542	0.768	0.454	0.736	0.559	0.657	0.598	0.505	0.566	0.194	0.480	0.537
Deviation of 8a from Average RTC Table (RTC frequencies used for weights)															
Bias	-0.239	-0.942	-0.841	-0.772	-0.972	-0.528	-0.086	-0.435	-0.925	-0.086	-0.396	-0.482	-0.256	-0.955	-0.565
AAD	0.601	1.302	1.811	1.009	1.139	0.829	1.167	2.432	1.016	0.757	0.949	1.146	0.839	1.158	1.154
RMS	0.947	2.178	2.753	1.528	1.999	1.386	1.552	3.298	1.239	0.832	1.336	1.466	1.221	1.509	1.787
Wt-Bias	0.009	0.107	0.148	0.071	-0.118	0.092	-0.231	-0.258	-0.046	-0.049	-0.163	0.204	0.000	0.086	-0.011
Wt-AAD	0.135	0.232	0.317	0.423	0.132	0.219	0.319	0.345	0.335	0.586	0.252	0.412	0.262	0.372	0.310
Wt-RMS	0.178	0.330	0.420	0.537	0.250	0.270	0.377	0.497	0.434	0.667	0.306	0.462	0.303	0.440	0.410
Deviation of MEPS Experimental Table from 8a															
Bias	0.356	-1.673	-0.697	-0.023	-0.814	-0.592	1.002	-0.287	1.360	-0.183	-0.458	-0.012	0.608	-0.122	-0.110
AAD	0.555	2.265	0.986	1.116	1.442	2.042	1.934	1.168	1.384	0.495	0.819	0.370	1.558	0.638	1.198
RMS	0.771	3.241	1.108	1.385	1.942	2.826	2.965	1.282	2.038	0.583	0.914	0.516	2.170	0.806	1.840
Wt-Bias	-0.070	-0.842	-0.070	0.283	0.707	0.414	-0.250	-0.071	0.255	-0.349	0.083	-0.035	-0.215	-0.439	-0.043
Wt-AAD	0.368	0.850	0.659	0.357	0.820	0.515	0.433	0.703	0.313	0.606	0.595	0.046	0.305	0.717	0.535
Wt-RMS	0.436	0.986	0.749	0.414	0.884	0.589	0.548	0.818	0.454	0.694	0.661	0.079	0.627	0.851	0.668
Deviation of MEPS Experimental Table from Average RTC Table															
Bias	0.117	-2.615	-1.538	-0.795	-1.786	-1.120	0.916	-0.721	0.435	-0.269	-0.854	-0.494	0.352	-1.077	-0.675
AAD	0.519	3.442	2.096	1.017	2.294	1.568	1.366	1.854	0.808	0.750	1.299	1.430	0.947	1.177	1.469
RMS	0.581	5.309	3.358	1.240	3.001	2.358	1.897	2.435	1.136	0.894	1.897	1.861	1.133	1.400	2.358
Wt-Bias	-0.059	-0.754	0.059	0.201	0.572	0.428	-0.446	-0.342	0.115	-0.477	-0.063	0.075	-0.184	-0.349	-0.087
Wt-AAD	0.436	0.768	0.881	0.444	0.789	0.584	0.635	0.736	0.601	0.488	0.771	0.441	0.670	0.568	0.629
Wt-RMS	0.493	1.126	0.984	0.501	0.880	0.652	0.707	0.874	0.673	0.509	0.857	0.515	0.760	0.739	0.757
Deviation of MEPS Experimental Table from Same Form RTC Table															
Bias	-0.063	-2.009	-1.635	0.219	-0.026	0.352	1.909	-0.822	1.963	-0.398	-0.517	0.919	0.341	-0.149	0.006
AAD	0.614	2.161	2.102	1.010	1.507	2.742	2.261	2.727	2.163	1.174	1.015	2.324	1.093	0.387	1.663
RMS	0.757	3.475	2.705	1.373	1.829	3.806	3.662	3.764	3.381	1.577	1.150	3.479	1.305	0.500	2.626
Wt-Bias	-0.011	-0.681	0.166	0.263	0.990	0.384	-0.296	-0.018	0.381	-0.229	0.261	0.103	-0.209	-0.268	0.060
Wt-AAD	0.471	0.681	0.969	0.412	1.033	0.501	0.641	0.745	0.773	0.284	0.696	0.463	0.672	0.493	0.631
Wt-RMS	0.531	0.883	1.081	0.496	1.073	0.706	0.809	0.854	0.958	0.367	0.777	0.726	0.764	0.583	0.784

Note. This table was taken from Prestwood, Vale, Massey, and Welsh (1985), Table 61.

APPENDIX B: OPLAN, CALIBRATION STUDY FOR ASVAB FORMS 11/12/13, 15 OCTOBER 1982

DEPARTMENT OF DEFENSE
HEADQUARTERS UNITED STATES MILITARY ENTRANCE PROCESSING COMMAND
2500 GREEN BAY ROAD
NORTH CHICAGO ILLINOIS 60064

REPLY TO
ATTENTION OF

MEPCT-P

15 OCT 1982

SUBJECT: 10 January 1983 Calibration Study for the Armed Services Vocational Aptitude Battery (ASVAB), Forms 11, 12, and 13

Commander, Eastern US Military Enlistment Processing Command
Commander, Central US Military Enlistment Processing Command
Commander, Western US Military Enlistment Processing Command

1. As previously announced by letter, MEPCT-P, HQ MEPCOM, 30 August 1982, SAB, the US Military Enlistment Processing Command will conduct a calibration study for new ASVAB Forms 11, 12, and 13 beginning 10 January 1983. This letter transmits the Operations Plan for the study (Inclosure 1).

2. It is imperative that this study be carried out precisely as planned. Errors in the calibration of a production test are particularly bad because they affect the score of every individual tested during the life of the test. Such errors have the effect of making small but capricious changes in the standards of the services and service training programs which use the test. This is the only study which will be conducted on applicants before the test batteries are implemented on 1 October 1983. Errors will be minimized only by rigorous adherence to prescribed procedures and aggressive identification and resolution of unanticipated problems.

3. Recruiting service commanders have been informed of potential processing impacts and have been provided a copy of the Operations Plan and this letter of transmittal.

FOR THE COMMANDER:

1 Incl
as

J. A. WHITE
Colonel, USA
Deputy Commander/Chief of Staff

CF:
CO, ea MEPS
Cdr, HQ USAREC, ATTN: USARCRO-E
Cdr, Navy Rctg Comd, ATTN: 20
Cdr, USAF Rctg Svc, ATTN: RSXM
Comdt, USCG, ATTN: G-PMR-5/62
Comdt, USMC, ATTN: MRRE
Comdt, USMC, ATTN: MPI-20
Mr. Dick Wood, OPM, Washington, DC
Cdr, Air Force Human Resources Laboratory, ATTN: Dr. Ree
Cdr, Air Force Manpower and Personnel Center, ATTN: MPCYPT/Maj Welsh

15 October 1982
HQ MEPCOM
Ft Sheridan, IL 60037

SUBJECT: Operations Plan (OPLAN) for January 1983 Calibration of Forms 11, 12 and 13 of the Armed Services Vocational Aptitude Battery (ASVAB)

1. SITUATION.

a. An ASVAB calibration study has been agreed to by the ASVAB Steering Committee and the Commander of the US Military Enlistment Processing Command (MEPCOM). The study is designed to calibrate ASVAB composite scores against the 1980 Youth Population.

b. The study will be conducted at all of the Military Entrance Processing Stations (MEPS) (including all of the associated Mobile Examining Team (MET) sites), except Anchorage, Butte, Fargo, Guam, San Juan, and Sioux Falls in order to assure a proper sample. It will commence on 10 January 1983. The study will last until the required sample size of 63,000 applicants is obtained (about 4 weeks). Sampling requirements are given at annex A.

2. MISSION. To conduct a calibration study of new versions of the ASVAB by administering experimental test booklets to applicants.

3. RESPONSIBILITIES.

a. HQ MEPCOM:

(1) Designate a project manager at HQ MEPCOM (Dr. Lehnus, MEPCT-P, AUTOVON 459-2881/3373; alternate point of contact: CDR Young, same location).

(2) Provide contractor and contracting office technical representative (Capt Massey, USAF, Air Force Human Resources Laboratory (AFHRL), AUTOVON 240-3256; alternate point of contact: Dr. Malcolm Ree, same location) a list of the number of experimental test booklets, experimental test administrative manuals, experimental answer sheets, and required sample size required for each MEPS. (Those requirements are listed at annex A.)

(3) Inform the Director of Office of Personnel Management (OPM) of the calibration study and arrange for additional testing.

(4) Prepare and distribute an OPLAN for this study to sectors/MEPS.

(5) Ensure that the contractor's administrative manuals are compatable with MEPCOM's operational requirements and meet MEPCOM's administrative and testing standards.

(6) Notify AFHRL of problem situations or shortfall conditions NLT 1 working day after detection.

b. AFHRL:

(1) Provide the contractor with instructions necessary to produce the test booklets and test administrative manuals for the calibration study.

(2) Provide the contractor with experimental answer sheets to be used for the calibration study.

(3) Receive from the MEPS, visually scan, and inventory completed experimental answer sheets.

(4) Inform MEPCOM of deficiencies of experimental answer sheets received; request an extension of such testing as may be required to compensate for any deficiencies.

(5) Optically scan experimental answer sheets and prepare for the contractor a magnetic tape with item response data; ship tape to contractor.

(6) Safeguard experimental answer sheets for 6 months from date of testing, then destroy.

c. Contractor (Assessment Systems Corporation):

(1) Produce test booklets and test administrative manuals to be used in the calibration study.

(2) Accommodate MEPCOM quality control procedures by supplying MEPCOM with copies of test booklets and test administrative manuals prior to printing.

(3) Receive and inventory answer sheets from AFHRL.

(4) Package for direct distribution to the MEPS test booklets, test administrative manuals, and answer sheets in accordance with guidance supplied by MEPCOM (annex D).

(5) Accommodate MEPCOM quality control of packaging prior to shipping.

(6) Ship all test materials to arrive at the MEPS no later than 1 December 1982.

(7) Provide AFHRL with blank magnetic tapes for recording of item response data.

(8) Receive from AFHRL item response data on magnetic tape and provide analysis as specified in contract.

d. MEPCOM sector commanders (see annex B for summary):

(1) Report to the project manager (Dr. Lehnus, AUTOVON 459-2881/3373) the status of receipt of test materials at the MEPS NLT 13 December 1982. Report to the project manager the status of MET site receipt of testing materials NLT 20 December 1982.

(2) Coordinate implementation of the calibration study with OPM regions to assure implementation as specified in the execution plan below. This includes providing all clarifying administrative instructions.

(3) Report to the project manager the dates when MEPS (1) implement, (2) complete the study, and (3) the weekly status of MEPS testing.

(4) Monitor the calibration study and coordinate information/problem areas between MEPS and HQ MEPCOM, ATTN: MEPCT-P.

e. MEPS commanders (see annex B for summary):

(1) Ensure receipt and distribution of experimental materials, as necessary, within specified time limits.

(2) Monitor the study and coordinate information/problem areas between MEPS and sector headquarters. Direct contact with the contractor or AFHRL is not authorized without HQ MEPCOM's approval.

(3) Coordinate with local OPM officials/examiners to insure receipt and implementation of calibration study booklets in accordance with the contractor's and this OPLAN's instructions.

(4) Coordinate with Interservice Recruitment Committee (IRC) officials concerning the resulting two-test, 5-hour schedule and the revised testing schedules that may result.

(5) Administer test booklets/materials IAW the the contractor's instructions; ship experimental answer sheets to AFHRL. Test administrators (TAs) and Chief, Testing Management Sections (CTMS) must be thoroughly familiar with this OPLAN and strictly adhere to proper administration and handling procedures; otherwise, individual MEPS testing requirements will be increased to replace unprocessable samples.

(6) Report receipt of materials, distribution of materials to METs, start date, weekly testing totals, and finish dates of the study to sector headquarters.

4. EXECUTION. MEPS:

a. Review OPLAN and prepare for implementation to include coordinating with OPM officials/examiners and planning the distribution of various types of test booklets (see paragraph 4r.).

b. All calibration study testing will be reported as a special test ("11, 12, 13 calibration study") on the Testing Program Report, indicating who administered the exam (OPM or military).

c. Local coordination will be conducted with the recruiting services and OPM TAs to adjust current test schedules to provide for the additional time required to administer the experimental test (approximately 1 1/2 hours). Some adjustment will have to be made to develop test schedules which allow the time for experimental testing during the calibration study. In addition, each MEPS commander must inform the IRC representatives of this study, so that the message may be passed on to recruiters at the working level. (Recruiting commanders have been informed by letter.)

d. Every effort should be made to continue 1-day complete processing and/or shipment; however, proper test administration will take precedence over 1-day shipping and it is understood that this will not always be possible due to the constraints of this study.

e. When two OPM MET sessions are concurrently scheduled on the same day by the same test administrator, the second ASVAB test session will be cancelled when necessary, in advance, so that the experimental test can be administered.

f. When a MET tester is scheduled for an institutional test and a production test on the same day, the institutional test will take precedence unless the school can be rescheduled. The production test scheduled for that particular day may have to be cancelled or rescheduled.

g. The Chief, Testing Management Section (CTMS) will visit as many MET sites as feasible immediately prior to or during the calibration study to assure experimental testing procedures are understood and followed and to assure that TAs appreciate the importance of the study*. This activity has been specifically recommended by the Defense Advisory Committee on Military Personnel Testing, a blue-ribbon panel of testing experts whose congressional mandate is to insure the quality of personnel testing in the military. The CTMS will keep a record of visits made. Any observations which might contribute to our understanding of how to conduct calibration studies (e.g. misunderstood instructions or circumstances which make it difficult to follow prescribed instructions) should be written up and transmitted to the sectors NLT 72 hours after the visit. Sectors will transmit these observations to the project manager.

h. The Informed Consent Announcement form at annex C must be read to all applicants at the start of each test session.

i. A break should be given between experimental testing and ASVAB testing. Normally, this will be a 10-minute restroom break. A lunch break of up to an hour may be allowed if time and conditions permit. Under no circumstances will the testing extend overnight.

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*Errors in the calibration of a production test are particularly bad because they affect the score of every individual tested during the life of the test. Such errors have the effect of making small but capricious changes in the standards of every service and training program which use the test. These errors will be minimized only by rigorous adherence to prescribed procedures by ALL TAs.

j. Every individual who tests or retests during the calibration study must complete the experimental test along with his/her production test. If any applicant fails to complete the experimental test, the ASVAB will be invalid. If, under unusual circumstances, the MEPS commander deems it appropriate, the applicant may be authorized an immediate retest under the provisions of paragraph 15 to MEPCOM Regulation 611-1, Enlistment Qualification Tests, 23 September 1982. The retesting, however, must also include the experimental test.

k. Verification testing of applicants will be done without additional experimental testing. The experimental test will be given only with the full ASVAB 9 or 10.

l. Sectors must be notified NLT 17 December 1982 to confirm that all necessary materials have been received, completely distributed, and in the hands of all testers by that date. Sectors will, in turn, notify the MEPCOM program manager of any shortfalls and status of distribution NLT 20 December 1982.

m. Inventory, store, and ship all experimental booklets and other related items as controlled material in accordance with MEPCOM Regulation 611-1. Forms 2988 and 2989 and associated procedures should be used to control experimental test booklets. Check the totals of each item received against the quantities described in annex A. Direct distribution to area OPM examiners by MEPS has been authorized by OPM for the purpose of this calibration study. If problems are incurred with direct distribution to OPM examiners, notify OPM area offices and sector headquarters immediately.

n. Each MEPS will receive from the contractor a supply of calibration test booklets, test administration manuals, and answer sheets. There will be nine different types of test booklets; each type of booklet contains a different combination of ASVAB subtests. The booklet type is printed on the cover of the booklet (1 through 9). For each type of booklet, there are two forms (A and B). The form is also printed on the cover of the booklet.

o. Corresonding to the nine types of calibration test booklets, there are nine types of test administration manuals. The numbering in the administrative manuals corresponds to that on the test booklets. It is imperative that all calibration test booklets used in a test session be of the same type as the administrative manual used in that session! The TA should check at the beginning of each session to assure that all test booklets are of the same type as the administrative manual. The answer sheet provided by the contractor will be used for all testing with booklets numbered 1 through 9.

p. The calibration test booklets will be reused for the duration of the study. After each test session, the TA should follow normal procedures to assure the booklets are not marked or defaced in any way.

q. All testing sites associated with each MEPS will conduct calibration testing, until that MEPS has met the quotas specified in annex A. The MEPS must meet or exceed the sample requirements for each of the nine booklet types.

r. The MEPS will determine the distribution of testing materials to the MET sites which is required to meet the sample requirements. It is suggested that each MET site receive only one type of calibration test booklet and the corresponding test administration manual, provided this will allow the MEPS to meet its quota for each type of test booklet. For each type of test booklet sent to any testing site, an equal number of versions A and B will be provided. The total number of booklets sent to each testing site should be based on the maximum number of applicants anticipated in a single test session.

s. MEPS should administer each type of test booklet on a rotating basis (i.e., administer type 1 on Monday, type 2 on Tuesday, etc.). This rotating schedule of test types may be adjusted to achieve the prescribed quota for each test type for the MEPS.

t. In each test session, an approximately equal number of calibration Forms A and B will be administered. Normal procedures will be followed to assure applicants sitting next to one another receive different forms.

u. In all test sessions, the calibration booklet will be administered before the production ASVAB. The production ASVAB will be administered following normal testing procedures. Data from the production ASVAB will not be used for calibration purposes in this study.

v. The volume of material that must be processed following a study of this magnitude dictates that the following special handling instructions be followed precisely. Failure to follow these instructions will cause the data to be lost. In particular, sets of answer sheets which do not have identical social security numbers cannot be processed by AFHRL.

(1) Ensure that all personal data are clearly encoded and completely filled in with pencil, not pen, on the calibration answer sheets. Social security numbers must be encoded on each answer sheet, and all answer sheets for an individual applicant must have the identical social security number.

(2) Ensure that responses are properly gridded (i.e., no circling of answers) and filled in with pencil, not pen.

w. At the end of each week, the MEPS will report to the sectors the total number of applicants who have taken each of the experimental booklets.

x. All experimental answer sheets will be sent to AFHRL in a single shipment after the MEPS has completed all assigned sampling. When a MEPS has completed its quotas, the MEPS will send (1) the completed experimental answer sheets, and (2) a name roster of applicants tested to AFHRL for scoring (copies of MEPCOM Form 603 will suffice and reproduction is authorized). A cover letter identifying the MEPS must be included inside each shipping container. All materials will be shipped by registered mail to:

Commander
Air Force Human Resources Laboratory
ATTN: MOAM/Roy Chollman
Brooks AFB, TX 78235

y. When a MEPS has completed all assigned sampling the remaining testing materials are to be forwarded from MET sites to the MEPS and held temporarily. HQ MEPCOM will confirm that each MEPS has forwarded to AFHRL sufficient useable answer sheets to meet sampling requirements, and so inform the sectors. Upon notification by the sectors that further testing is not required, the MEPS/CTMS will be instructed to destroy all experimental test materials.

ANNEX A

(Sample and Test Material Requirements for MEPS, Eastern MEPCOM for Jan 83 Calibration, ASVAB 11, 12, & 13) to Jan 83 Calibration, ASVAB 11, 12, & 13 .

MEPS	Number of Sets* Test Booklets	Number of Sets** Admin Manuals	Number of Answer Sheets	Sample Size Each Booklet	Total Sample Size
Albany, NY	20	3	920	65	585
Atlanta, GA	78	5	1,975	165	1,485
Baltimore, MD	85	5	2,760	240	2,160
Beckley, WV	31	3	710	45	405
Boston, MA	58	4	2,025	170	1,530
Buffalo, NY	72	4	1,400	110	990
Charlotte, NC	40	5	1,400	110	990
Ft Jackson, SC	63	4	1,800	150	1,350
Harrisburg, PA	37	4	975	70	630
Jacksonville, FL	27	4	1,535	120	1,080
Manchester, NH	24	4	765	50	450
Miami, FL	42	3	1,150	120	1,080
New Haven, CT	23	3	820	55	495
New York, NY	29	4	3,280	290	2,610
Newark, NJ	65	4	1,975	165	1,485
Philadelphia, PA	62	4	2,235	190	1,710
Pittsburgh, PA	54	4	1,700	140	1,260
Portland, ME	26	4	870	60	540
Raleigh, NC	63	5	1,600	130	1,170
Richmond, VA	29	4	1,760	145	1,305
Springfield, MA	16	3	870	60	540
Syracuse, NY	44	3	1,130	85	765
Tampa, FL	17	2	1,150	90	810
Wilkes-Barre, PA	20	4	975	70	630
	1,025	92	35,780	2,695	26,055

*A set of test booklets consists of 18 booklets: 1 of each form (A or B) for each type (1 through 9).

**A set of administrative manuals consists of 9 booklets: 1 of each type (1 through 9).

ANNEX A
(Sample and Test Material Requirements for MEPS,
Central MEPCOM for Jan 83 Calibration, ASVAB 11, 12, & 13)
to Jan 83 Calibration, ASVAB 11, 12, & 13

	Number of Sets* Test Booklets	Number of Sets** Admin Manuals	Number of Answer Sheets	Sample Size Each Booklet	Total Sample Size
MEPS					
Chicago, IL	99	5	3,200	285	2,565
Cincinnati, OH	36	3	1,500	120	1,080
Cleveland, OH	46	4	2,130	180	1,620
Columbus, OH	37	4	1,400	110	990
Des Moines, IA	83	3	1,180	90	810
Detroit, MI	31	5	3,230	285	2,565
Indianapolis, IN	61	6	1,450	115	1,035
Jackson, MS	28	3	800	65	585
Kansas City, MO	36	4	1,550	125	1,125
Knoxville, TN	21	4	975	70	630
Little Rock, AR	37	3	975	70	630
Louisville, KY	38	4	1,240	95	855
Memphis, TN	47	4	1,190	90	810
Milwaukee, WI	47	5	1,700	140	1,260
Minneapolis, MN	40	4	1,600	130	1,170
Montgomery, AL	43	5	1,900	160	1,440
Nashville, TN	24	3	1,080	80	720
New Orleans, LA	25	3	1,190	90	810
Omaha, NE	18	3	820	55	495
Shreveport, LA	20	3	765	50	450
St Louis, MO	51	5	5,500	170	1,530
	868	83	35,375	2,575	23,175

*A set of test booklets consists of 18 booklets: 1 of each form (A or B) for each type (1 through 9).

**A set of administrative manuals consists of 9 booklets: 1 of each type (1 through 9).

ANNEX B
SEQUENCE OF ACTION
to
Jan 83 Calibration, ASVAB 11, 12, 13 Study

	AT DESIGNATED MEPS & MET SITES	SECTOR COMMANDS
15 Oct - 1 Dec	MEPS review OPLAN and plan the distribution and scheduling of experimental test booklets to assure different types are completed in same time frame.	Coordinate implementation with OPM regions.
1 Dec - 10 Dec	MEPS receive/inventory experimental test materials and distribute to OPM representatives. Log and check materials received against annex A of OPLAN. MEPS notify sectors of status when materials have been inventoried.	Notify MEPCT-P of any discrepancies in shipment to to MEPS.
NLT 13 Dec		Notify MEPCT of status of receipt of test materials at MEPS.
NLT 20 Dec	**MEPS distribute experimental test materials to MET and OPM test sites must be complete.**	Confirm completed MEPS/METS distribution with MEPCT-P.
10 Jan to completion	1. Begin administering experimental tests. Report start date to sector.	Report MEPS starting/weekly status to MEPCT-P.
	2. Report results to sector on a weekly basis.	
	3. Stop experimental testing when all quotas have been met. Report to sector. Ship all answer sheets to AFHRL/MOAM. Collect, inventory and secure all experimental test materials from the MET and OPM test sites.	
	4. On instructions from sectors, destroy all experimental test materials.	Transmit "destroy" instructions. to MEPS. Confirm destruction.

ANNEX C
INFORMED CONSENT ANNOUNCEMENT FOR CALIBRATION STUDY
to
January 83 Calibration, ASVAB 11, 12, & 13

Announce prior to handing out materials:

WE WILL BE ADMINISTERING TWO SETS OF TESTS TO YOU TODAY. THE TESTING WILL REQUIRE ABOUT FIVE HOURS OF YOUR TIME. BOTH TESTS ARE IMPORTANT AND NECESSARY FOR YOU TO APPLY FOR THE ARMED SERVICES AT THIS TIME. IF YOU HAVE A QUESTION, RAISE YOUR HAND. (PAUSE AND ANSWER QUESTIONS). IF YOU ARE NOT ABLE TO TEST FOR THE FULL SESSION, FOR ANY REASON, PLEASE INDICATE THIS BY RAISING YOUR HAND.

(Pause and release any one who wishes to leave.)

(Hand out materials after this point.)

ANNEX O
REQUIREMENTS FOR SHIPPING TEST MATERIALS TO MEPS
for
JAN 83 Calibration Study of 11, 12, & 13

1. All testing materials (test booklets, test administrative manuals, and answer sheets must be shipped by first class, registered mail.

2. All testing materials must double wrapped. That is, materials must be wrapped in heavy paper and placed in cardboard boxes. The package must be able to withstand rough treatment without bursting.

3. Each package within the box must be labeled:

(a) "Controlled Test Materials: To be opened by Test Control Officer Only."

(b) "Store in a secure area only."

4. Each box must contain:

(a) A mailing label inside the paper wrap which is identical to the outside mailing label.
(b) A notice on top of materials inside the box which says "If found, open, reseal and notify MEPCOM (312) 926-2881."

(c) A shipping list which:

(1) Lists all test booklets by identifying numbers (e.g., "50 test booklets, #00351 through #00400").

(2) List all test administrative manuals and answer sheets by count (e.g. 5 sets of test administrative manuals; 200 answer sheets).

APPENDIX C: EQUATING GRAPHS

Note: Figures C-1 through C-12 show the equating comparisons for ASVAB 11a subtests and raw score composites based on the MEPS data. Figures C-13 through C-24 show equating comparisons for ASVAB 12a subtests and raw score composites based on the RTC data. Tables C-25 through C-36 compare equatings in MEPS and RTCs using ASVAB version 11a.

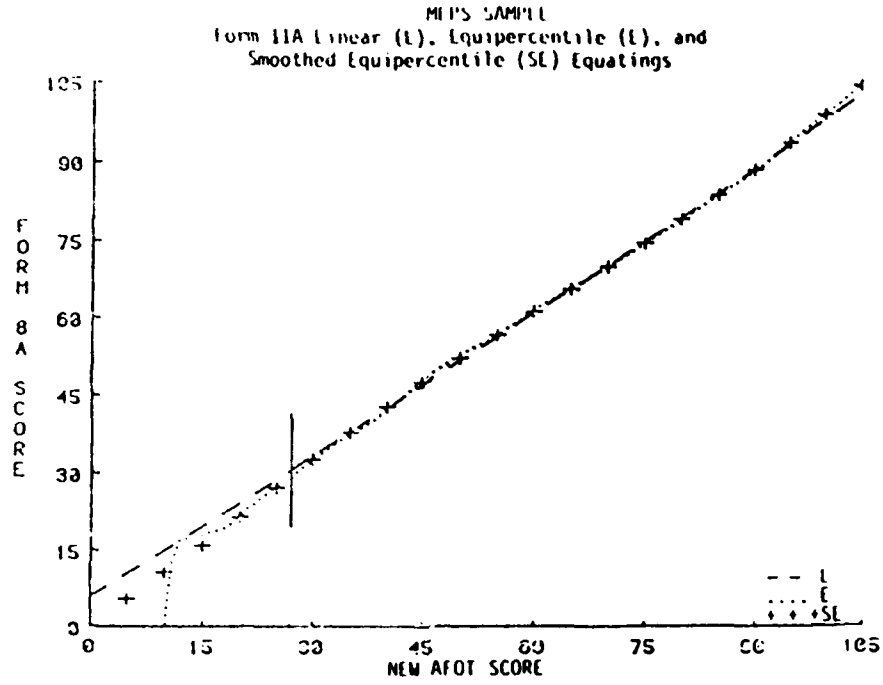

Figure C-1. Armed Forces Qualification Test (AFQT).

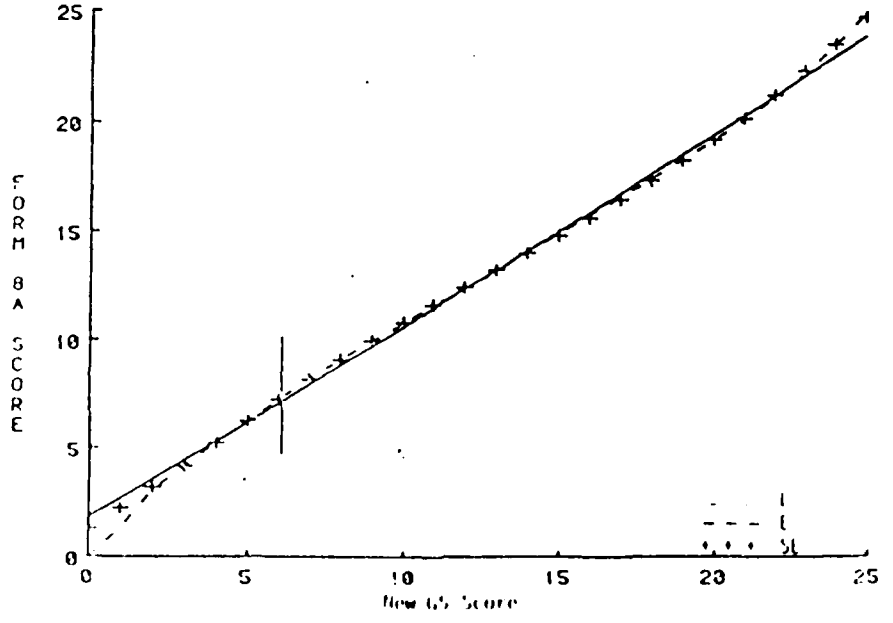

Figure C-2. General Science (GS).

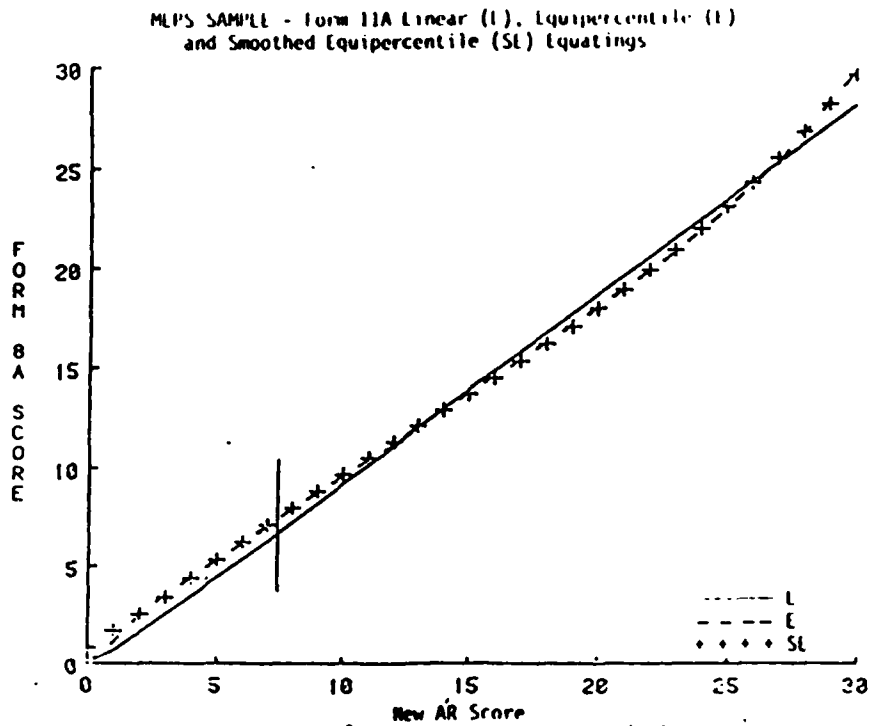

Figure C-3. Arithmetic Reasoning (AR).

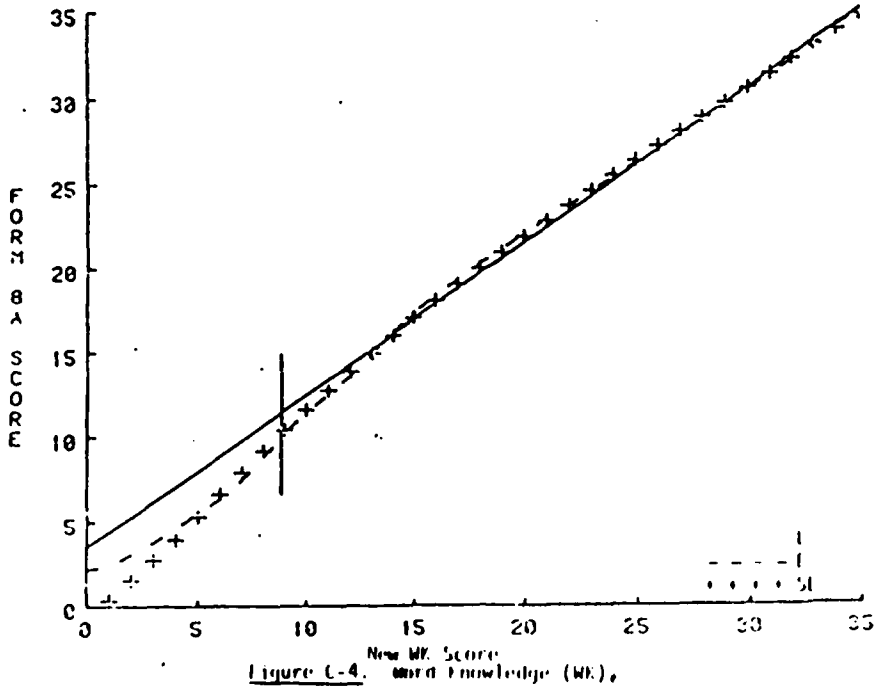

Figure C-4. Word Knowledge (WK).

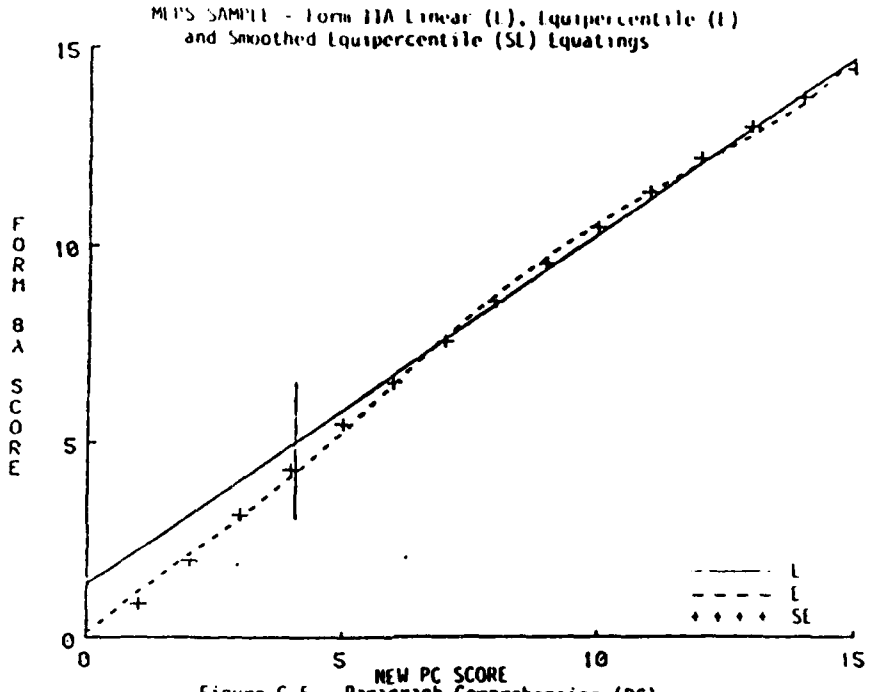

Figure C-5. Paragraph Comprehension (PC)

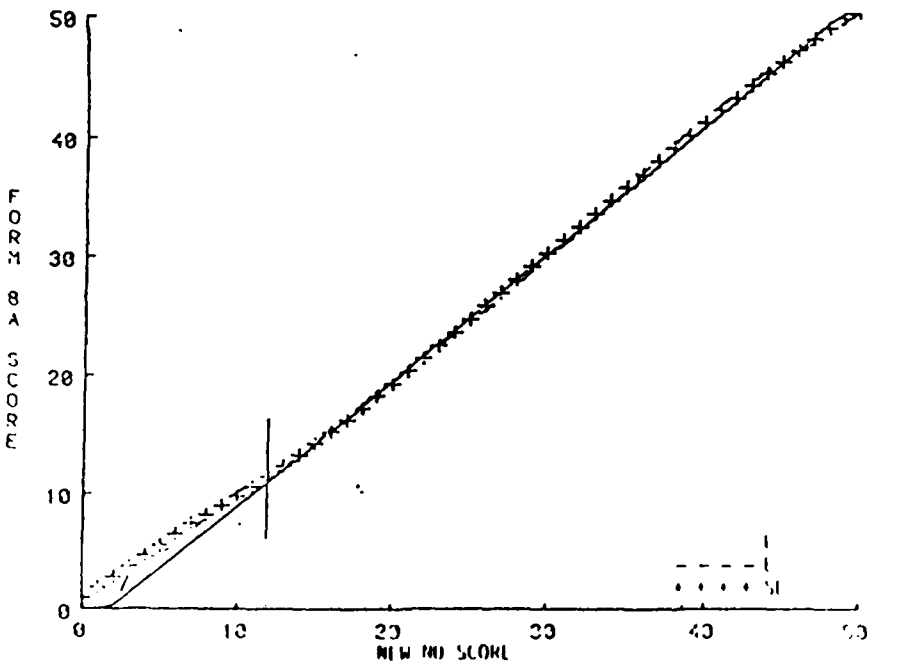

Figure C-6. Numerical Operations (NO).

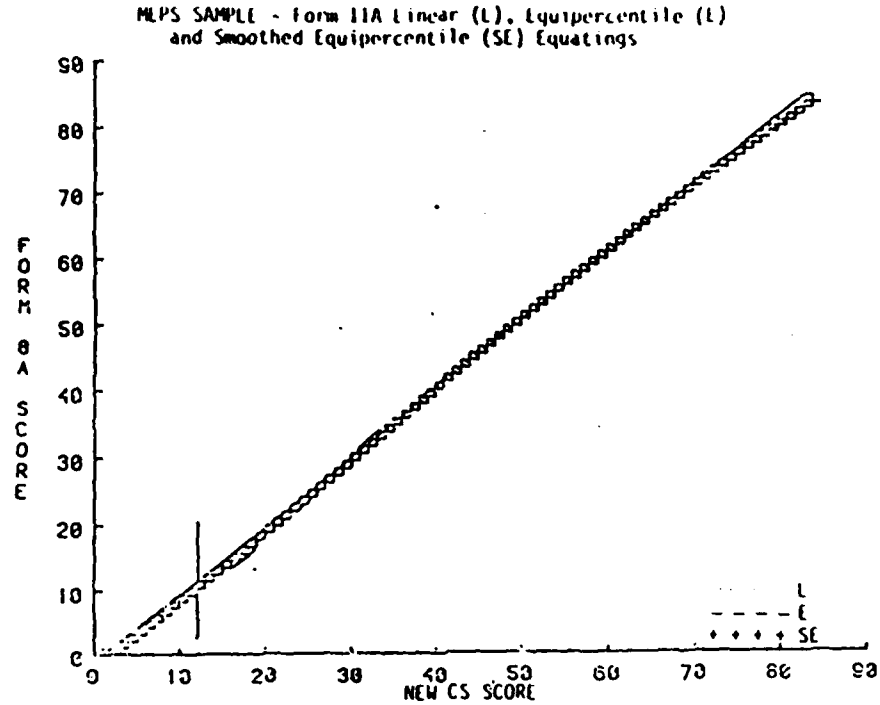

Figure C-7. Coding Speed (CS).

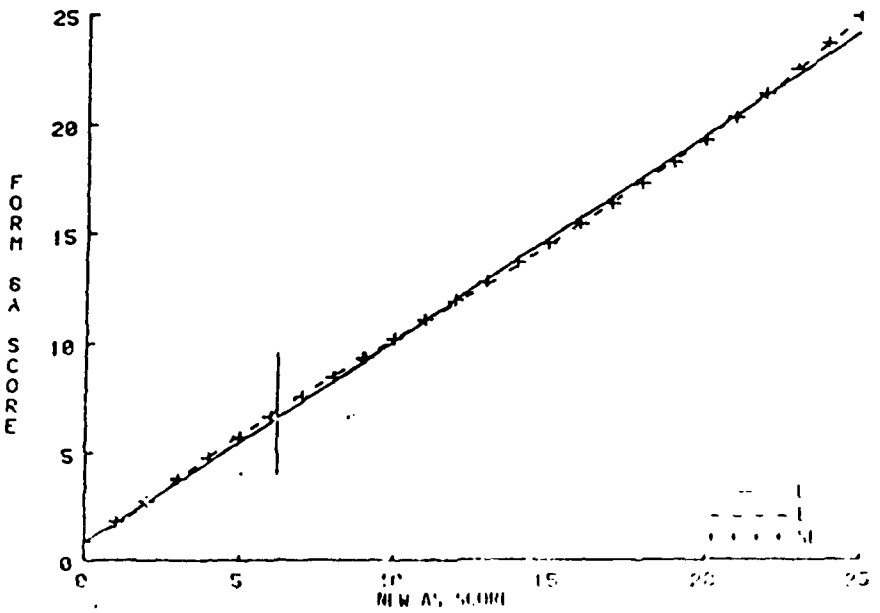

Figure C-8. Auto and Shop Information (AS).

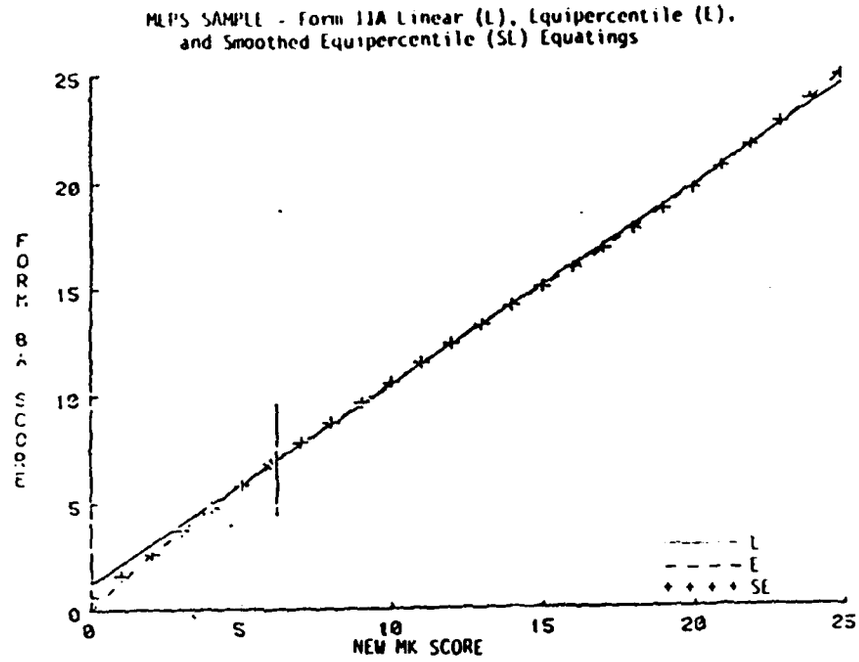

Figure C-9. Mathematics Knowledge (MK).

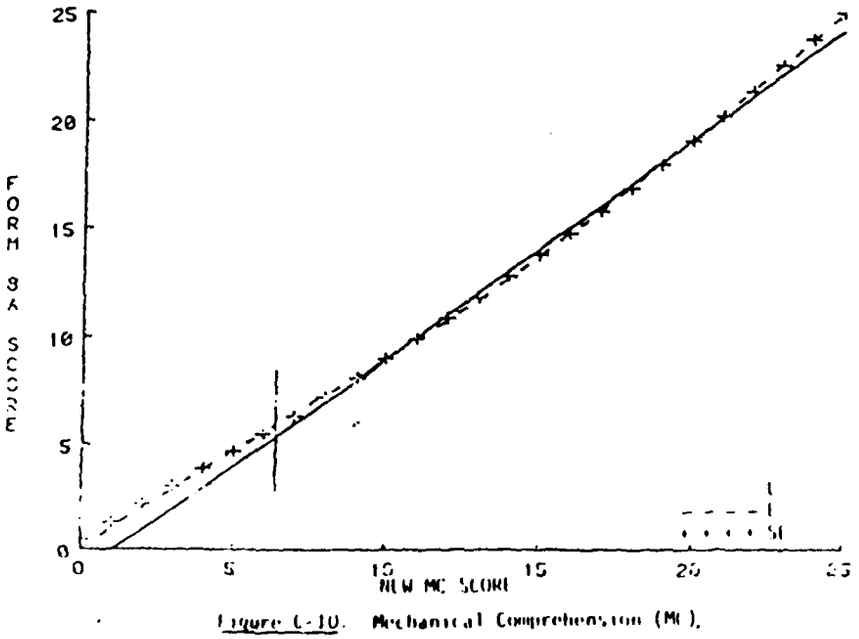

Figure C-10. Mechanical Comprehension (MC).

MEPS SAMPLE - Form 11A Linear (L), Equipercentile (E), and Smoothed Equipercentile (SE) Equatings

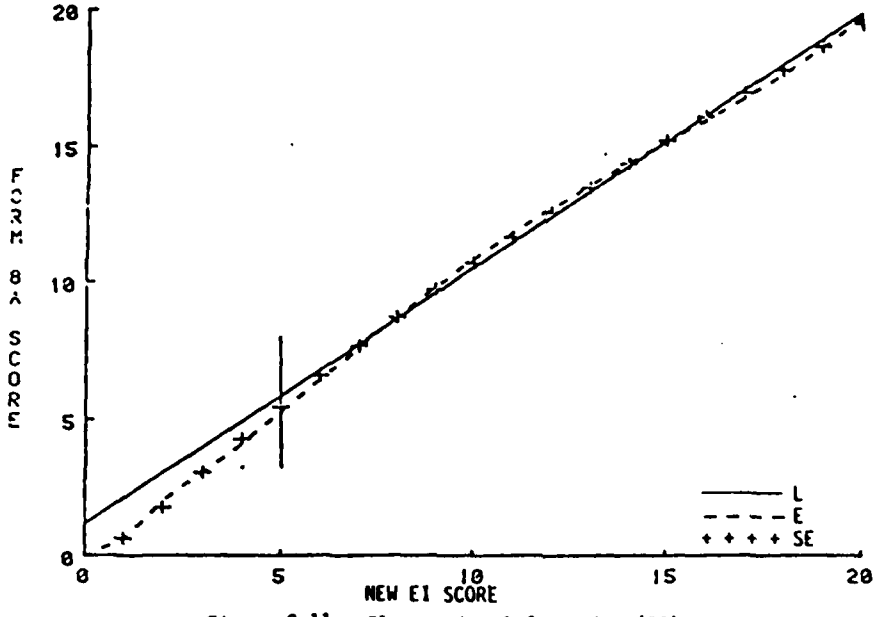

Figure C-11. Electronics Information (EI).

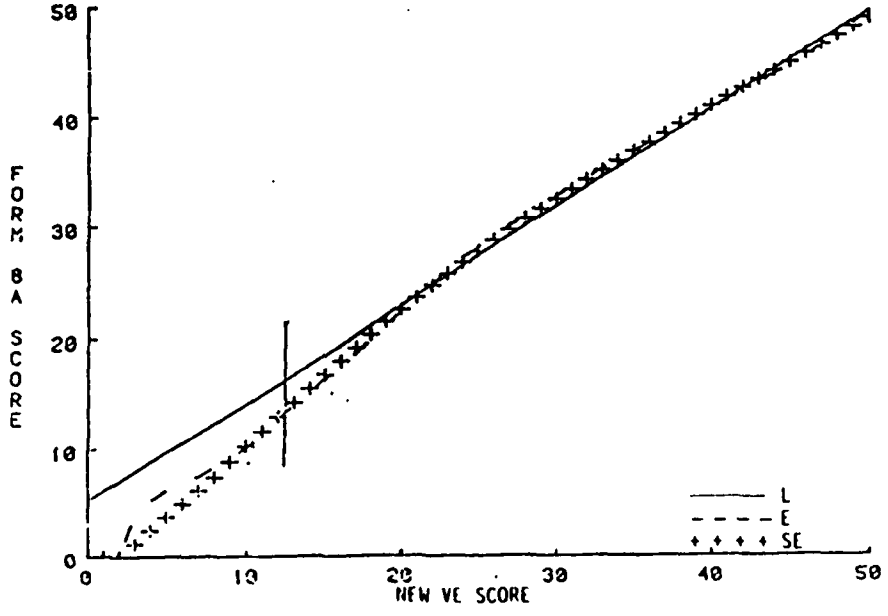

Figure C-12. Verbal (VE).

RTC SAMPLE - Form 12A Linear (L), Equipercentile (E), and Smoothed Equipercentile (SE) Equatings

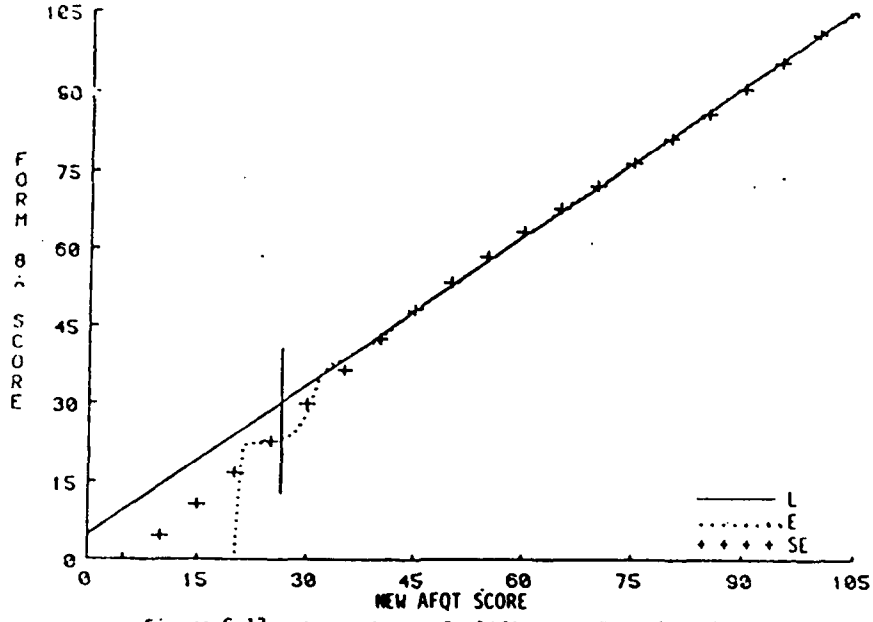

Figure C-13. Armed Forces Qualification Test (AFQT).

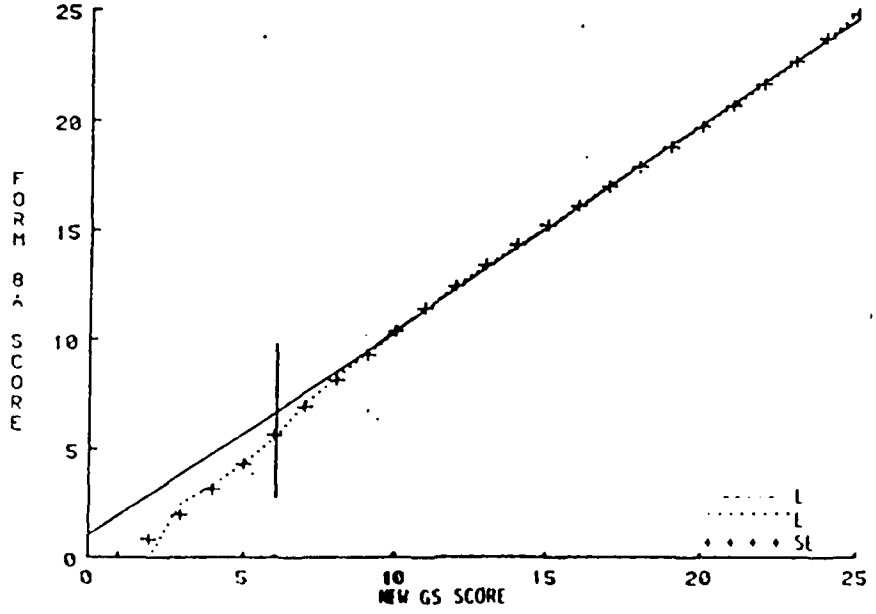

Figure C-14. General Science (GS).

RTC SAMPLE - Form 12A Linear (L), Equipercentile (E), and Smoothed Equipercentile (SE) Equatings

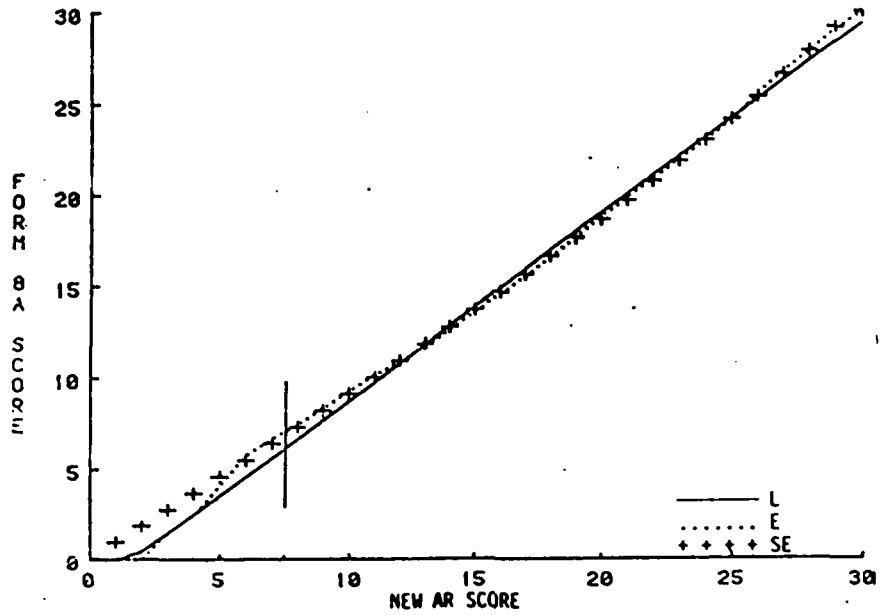

Figure C-15. Arithmetic Reasoning (AR).

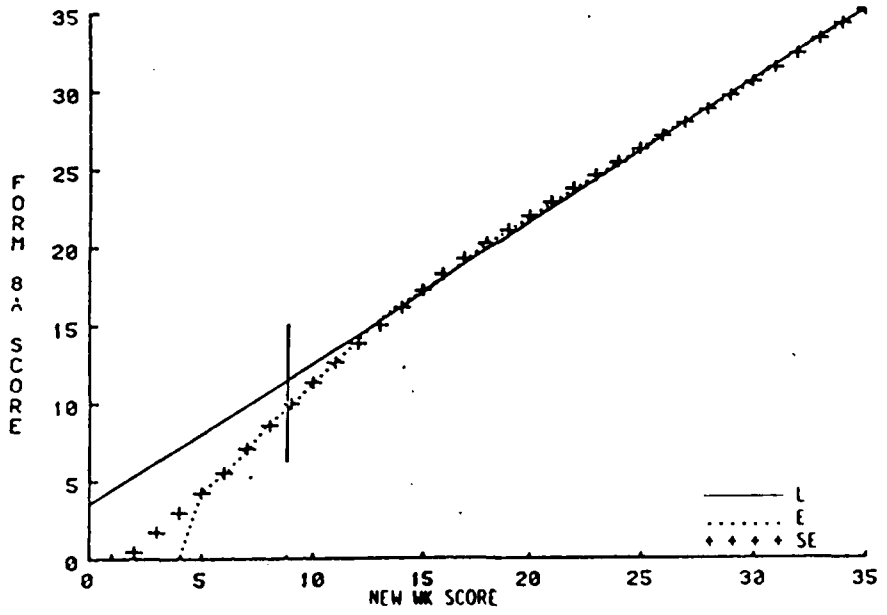

Figure C-16. Word Knowledge (WK).

RTC SAMPLE - Form 12A Linear (L), Equipercentile (E), and Smoothed Equipercentile (SE) Equations

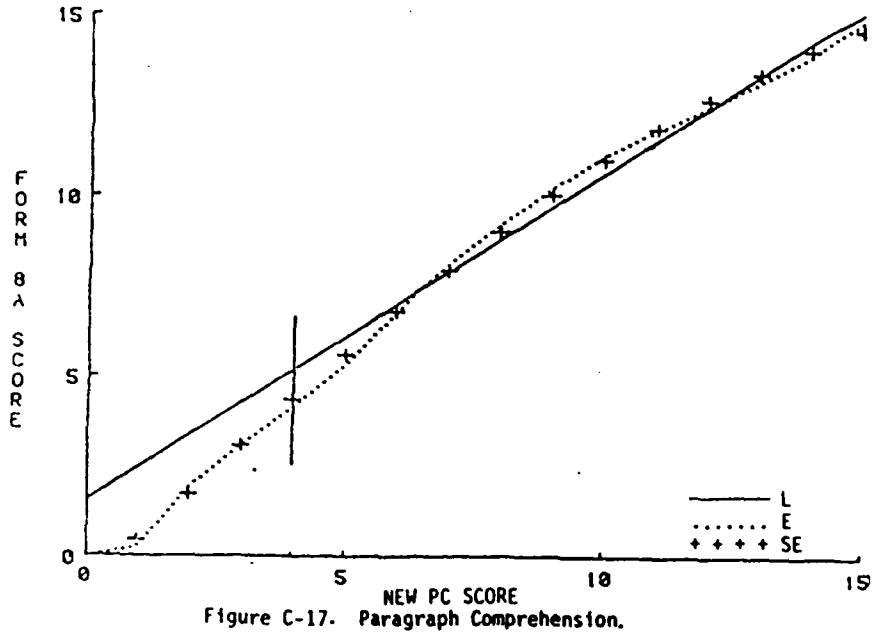

Figure C-17. Paragraph Comprehension.

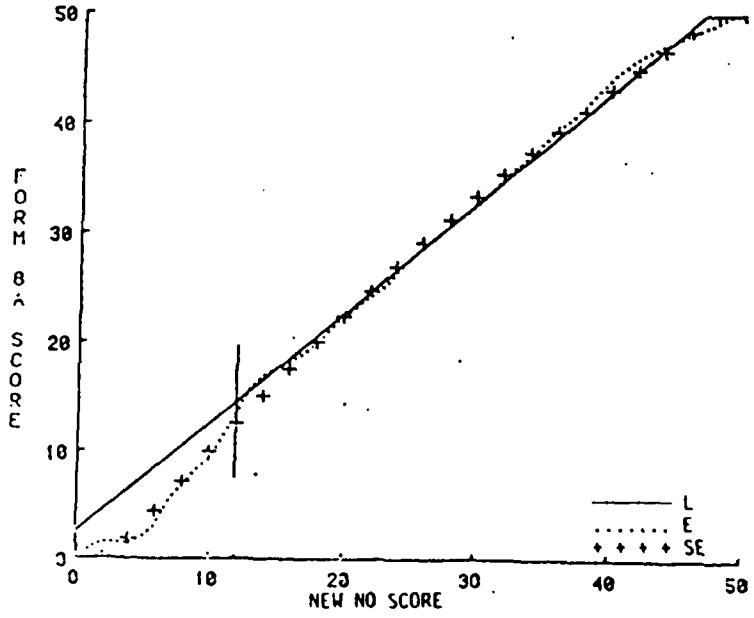

Figure C-18. Numerical Operations (NO).

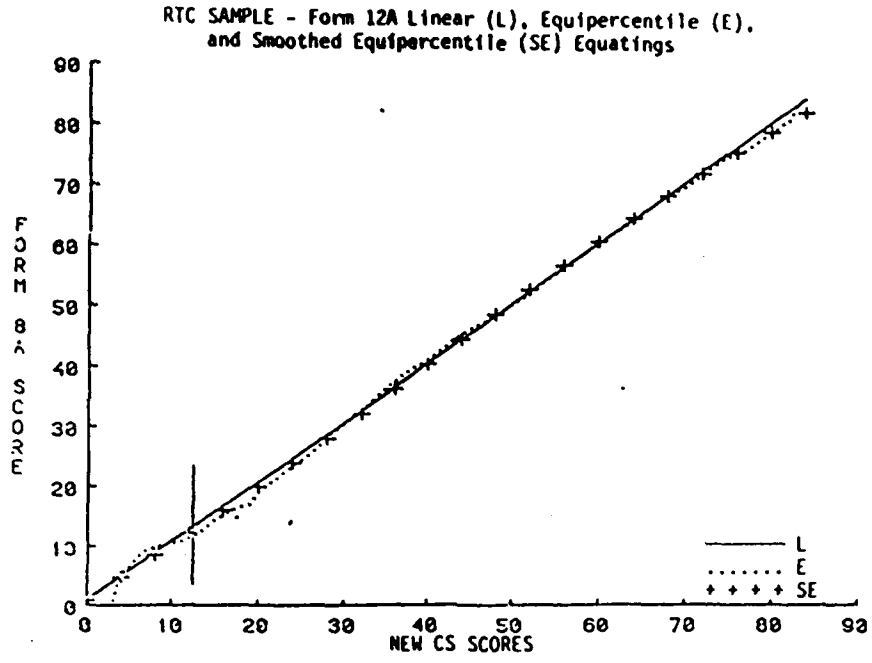

Figure C-19. Coding Speed (CS).

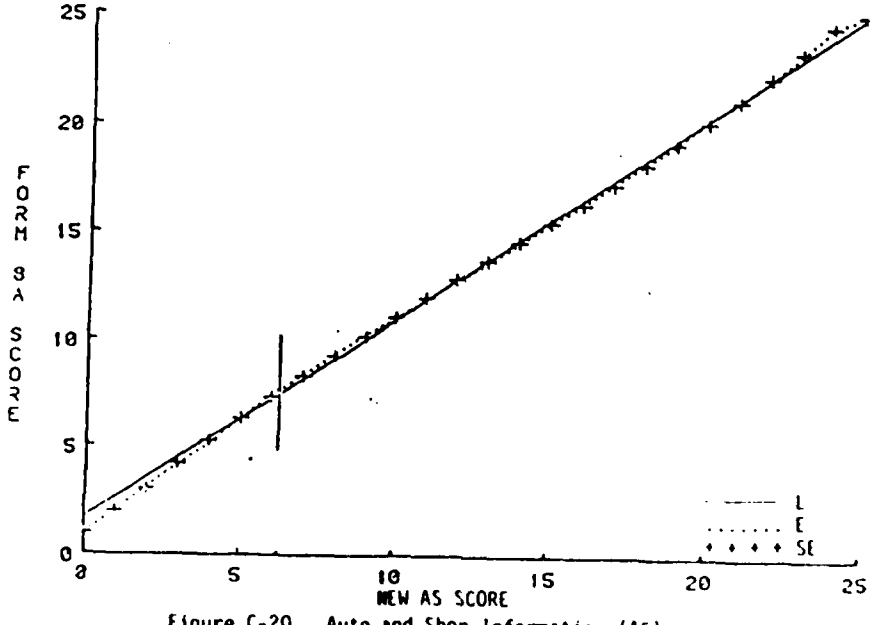

Figure C-20. Auto and Shop Information (AS).

RTC SAMPLE - Form 12A Linear (L), Equipercentile (E), and Smoothed Equipercentile (SE) Equatings

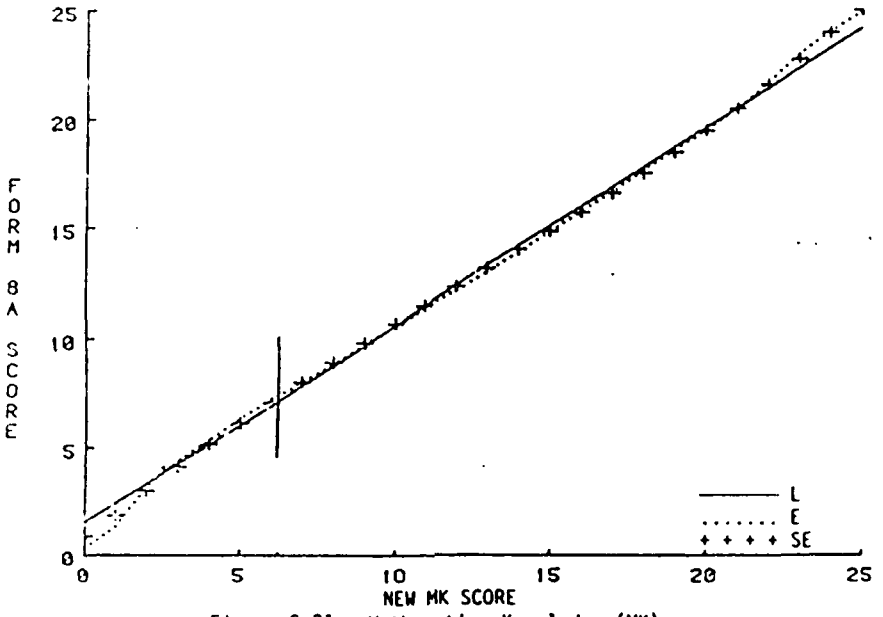

Figure C-21. Mathematics Knowledge (MK).

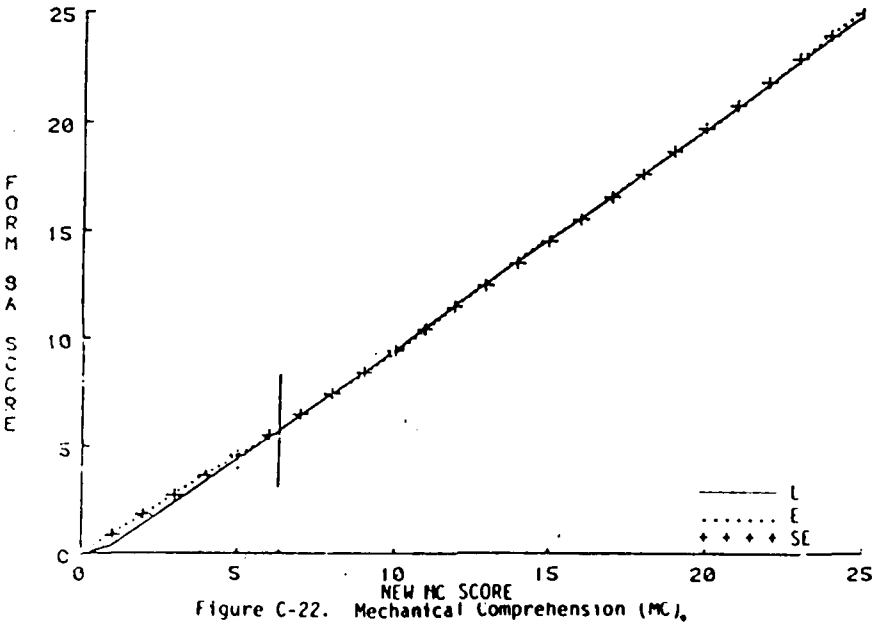

Figure C-22. Mechanical Comprehension (MC).

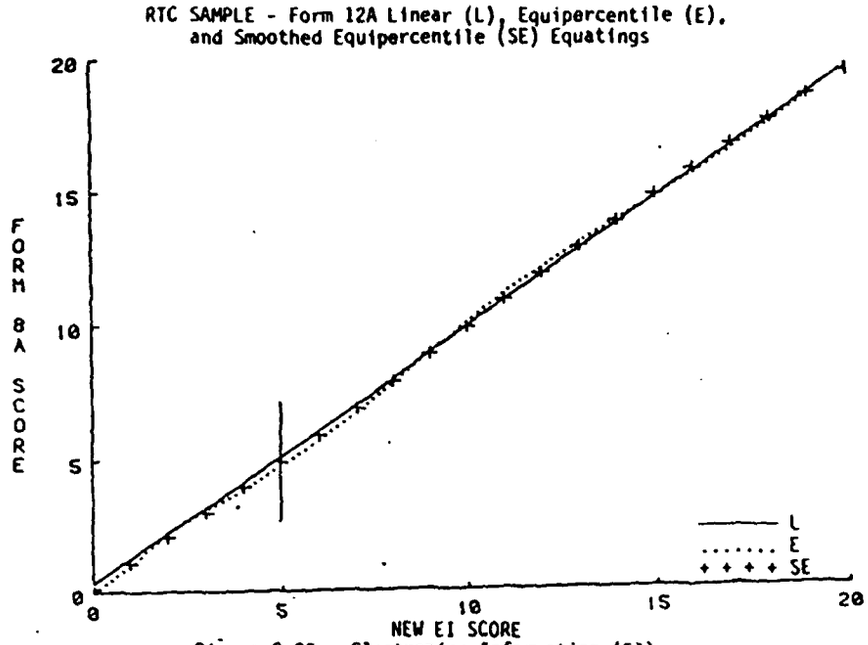

Figure C-23. Electronics Information (EI).

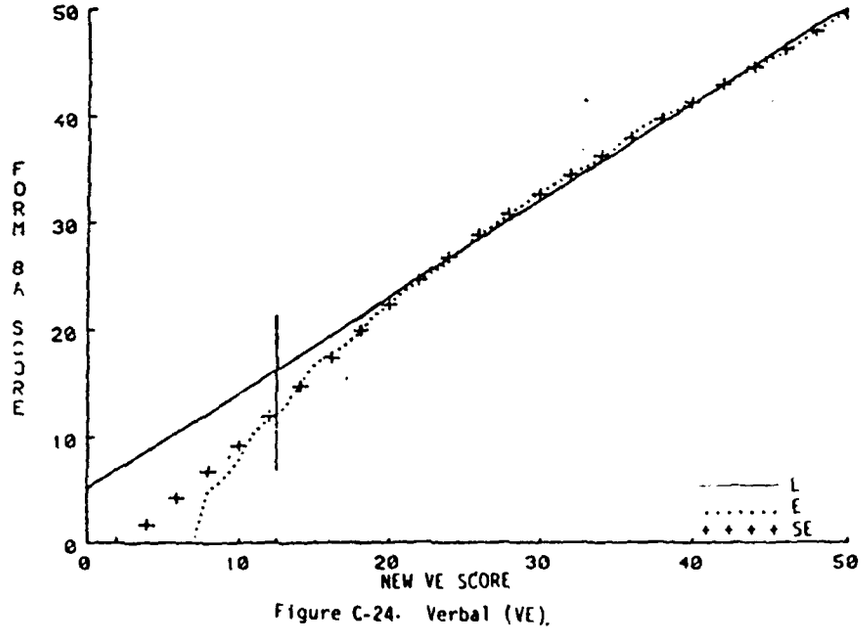

Figure C-24. Verbal (VE).

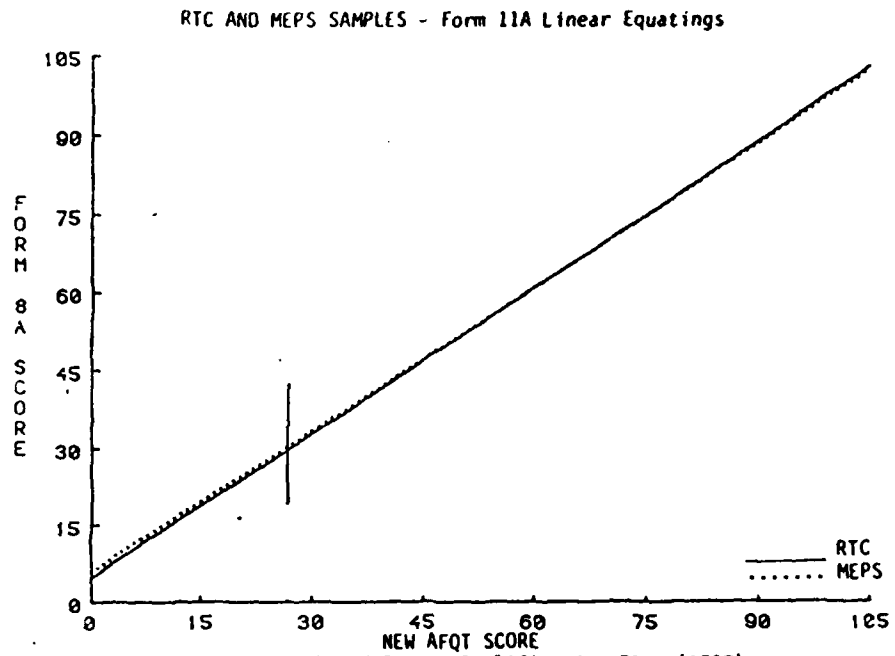

Figure C-25. Armed Forces Qualification TEST (AFQT).

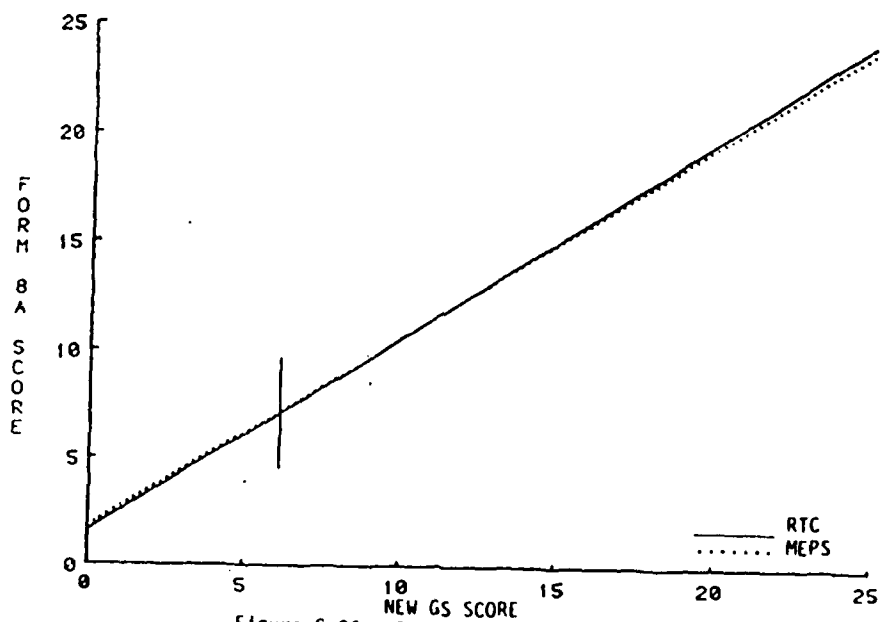

Figure C-26. General Science (GS).

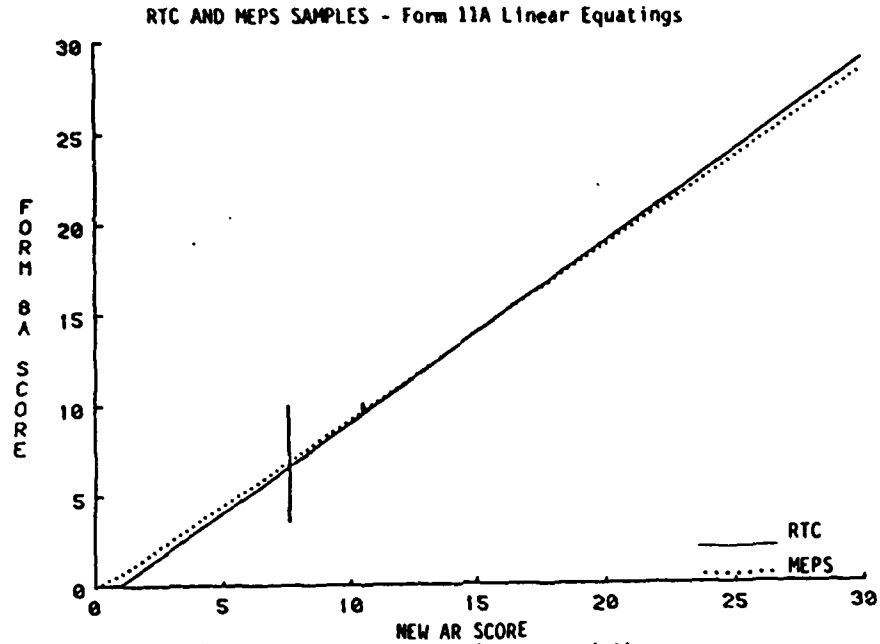

Figure C-27. Arithmetic Reasoning (AR).

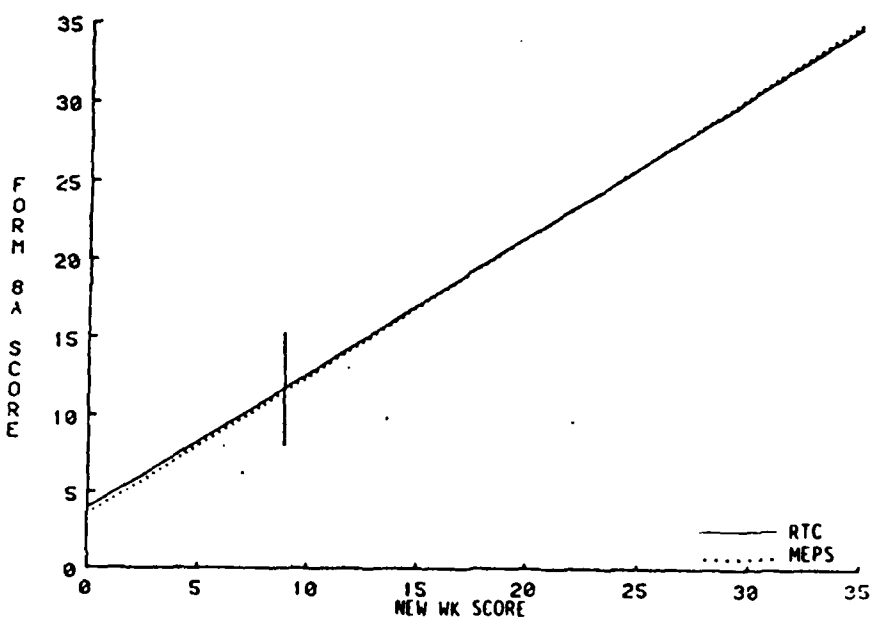

Figure C-28. Word Knowledge (WK).

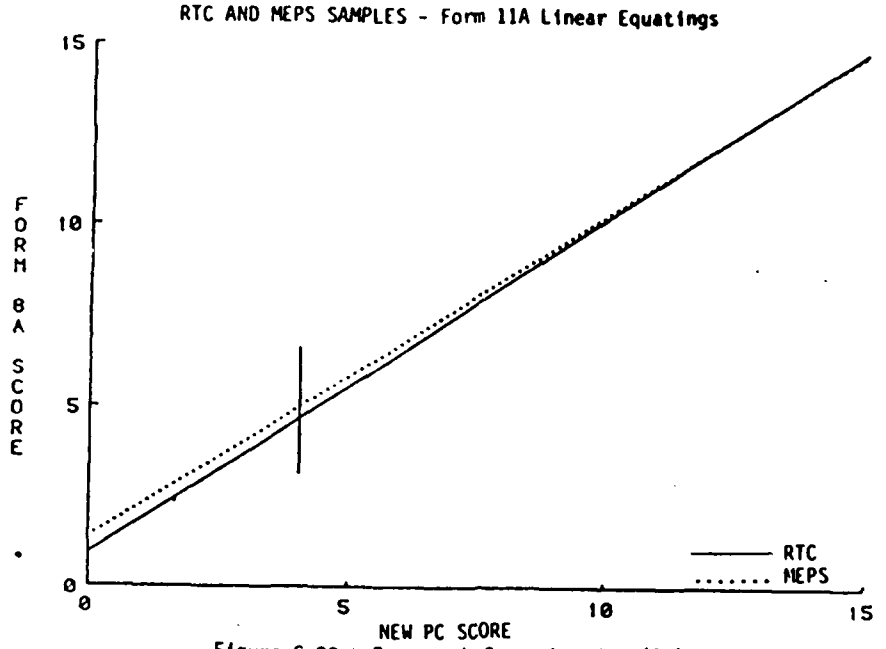

Figure C-29. Paragraph Comprehension (PC).

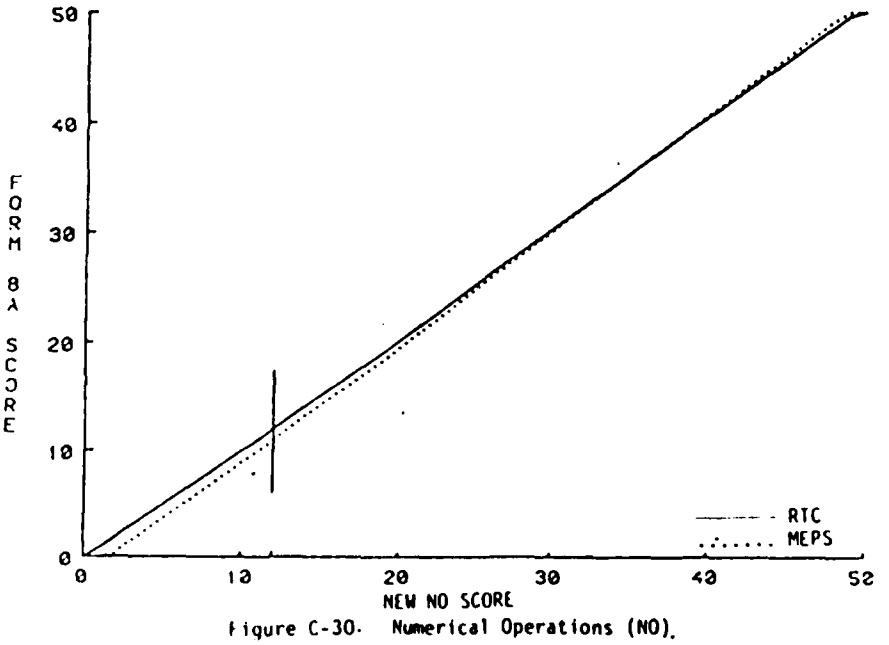

Figure C-30. Numerical Operations (NO).

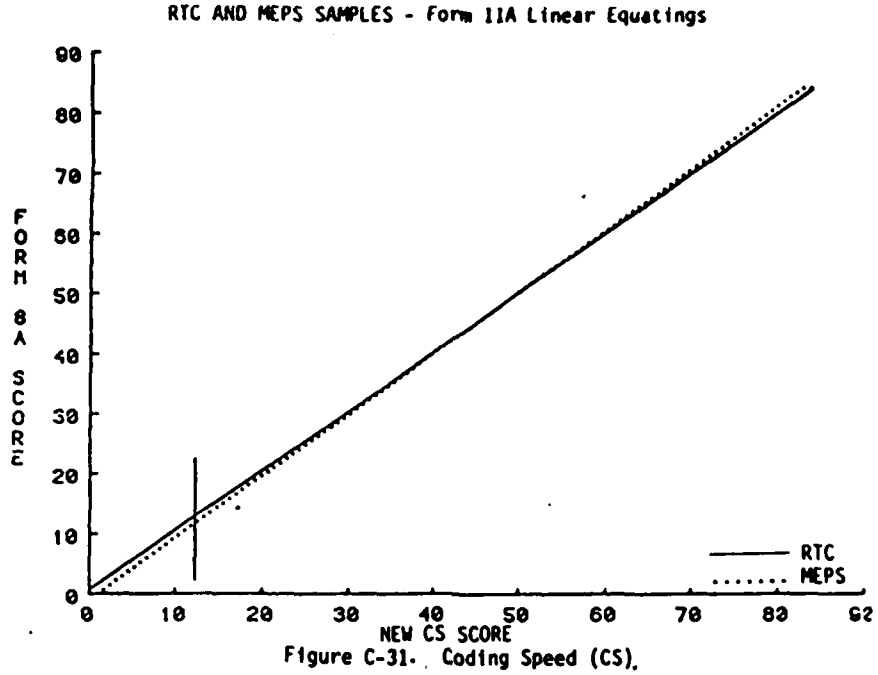

Figure C-31. Coding Speed (CS).

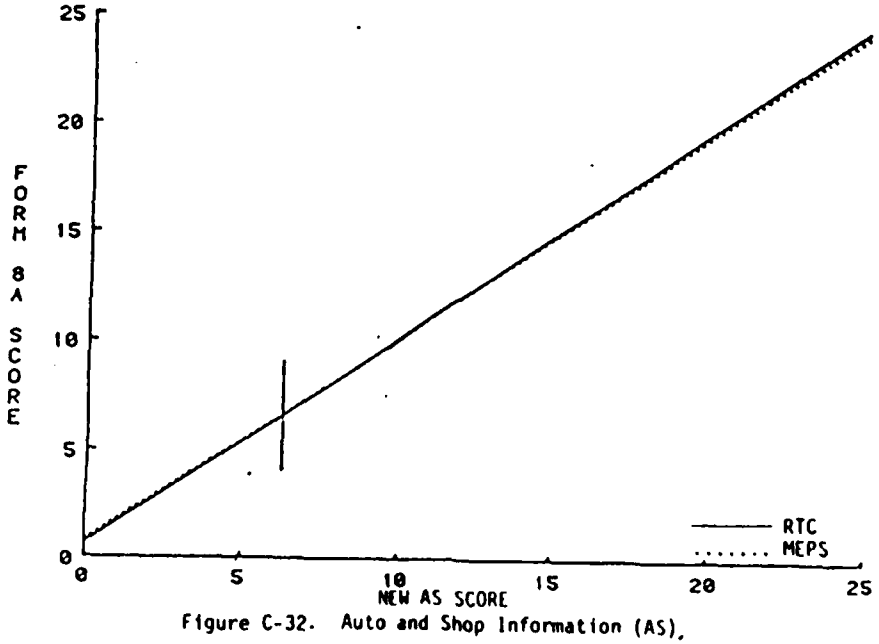

Figure C-32. Auto and Shop Information (AS).

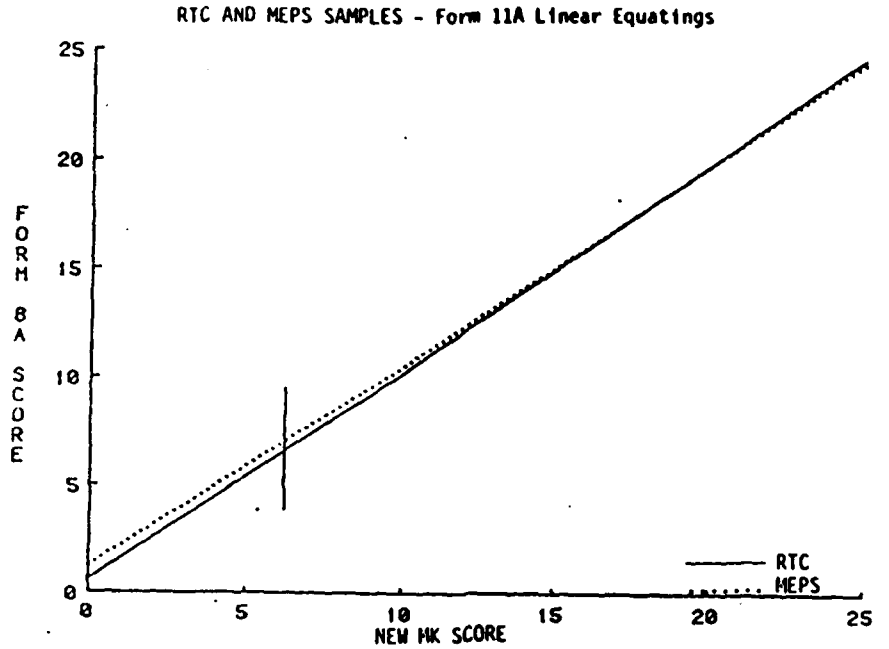

Figure C-33. Mathematics Knowledge (MK).

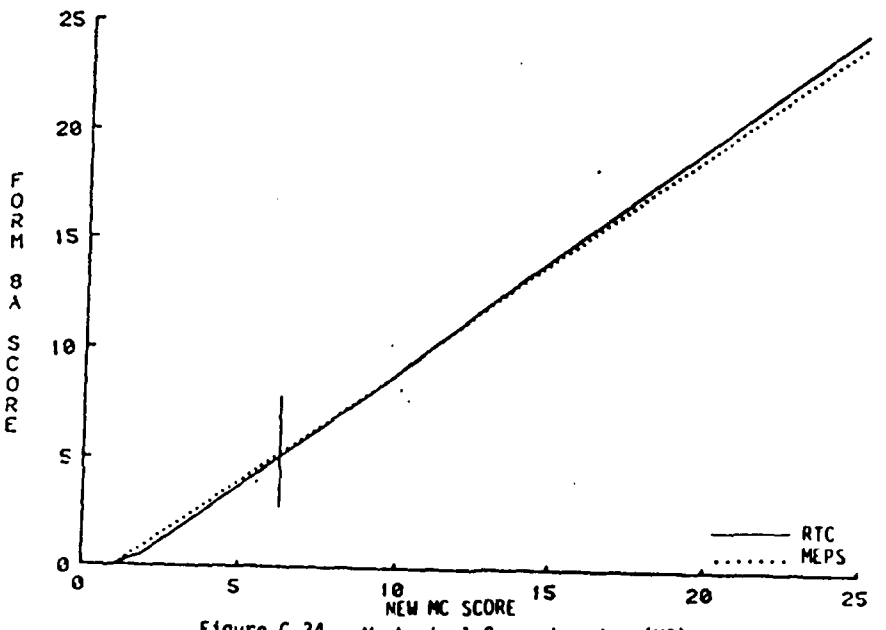

Figure C-34. Mechanical Comprehension (MC).

RTC AND MEPS SAMPLES - Form 11A Linear Equatings

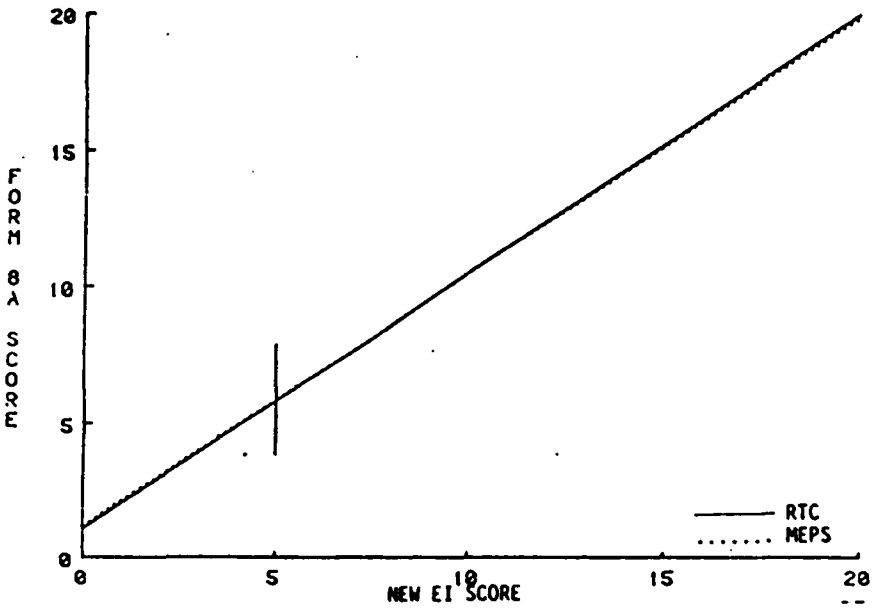

Figure C-35. Electronics Information (EI).

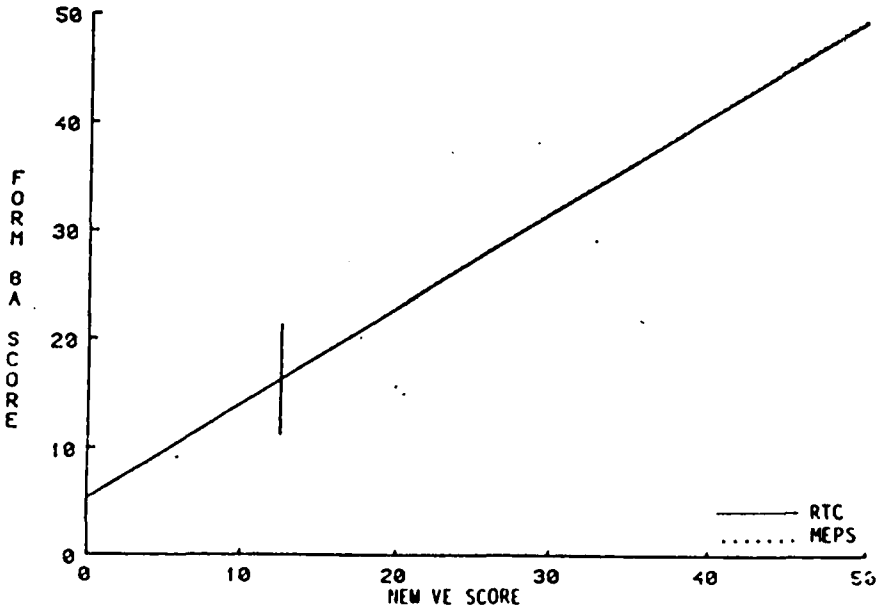

Figure C-36. Verbal (VE).

APPENDIX D: RAW SCORE FREQUENCIES MEPS (ASVAB 11A) AND RTCS (VERSION 12A)

Note: The raw score frequencies provided for "MEPS 158" are the frequencies for ASVAB 11a administered in the MEPS. The table titled "RTC-1(370)" represent the frequencies for ASVAB 12a administered in the Services' Recruit Training Centers. These tables can be used to evaluate equating graphs in Appendix C.

Table D-1. Test MEPS (158)

Raw Score Frequencies

	GS	AR	WK	PC	NO	CS	AS	MK	MC	EI	VE	AFQT
0	0	0	1	3	0	0	6	2	0	0	0	0
1	1	2	0	23	0	0	11	29	9	9	0	0
2	16	24	5	61	0	4	35	111	21	53	0	0
3	42	55	5	133	4	6	110	233	67	128	2	0
4	103	129	14	263	3	8	213	485	148	291	2	0
5	162	235	18	448	6	14	344	754	284	605	5	0
6	246	360	40	683	8	17	529	1021	497	796	4	0
7	344	488	63	957	16	20	638	1214	706	1139	3	0
8	450	652	92	1255	23	10	785	1227	888	1296	13	0
9	586	776	124	1512	28	18	850	1273	1028	1432	14	0
10	686	881	142	1615	27	21	936	1209	1225	1564	24	0
11	824	950	190	1704	22	25	977	1061	1376	1377	51	1
12	860	1043	220	1838	34	34	1008	975	1483	1357	64	1
13	1040	1086	308	2083	58	41	1085	916	1535	1358	56	0
14	1187	1179	347	2306	72	37	1177	818	1686	1199	83	0
15	1175	1061	379	2353	78	28	1153	702	1788	1159	96	3
16	1214	1167	375		98	58	1204	683	1767	1078	105	2
17	1130	1133	425		108	67	1230	663	1815	930	130	1
18	1155	1168	466		158	78	1208	617	1778	797	157	3
19	1148	1120	535		179	84	1271	594	1741	581	190	4
20	1054	1091	596		217	89	1324	557	1699	321	262	6
21	1023	1203	613		257	105	1385	516	1581		247	3
22	984	1066	700		342	112	1304	450	1316		273	8
23	869	1129	717		372	112	1261	500	1008		289	10
24	768	1160	726		428	136	1058	486	674		288	5
25	466	1099	796		509	145	584	427	253		318	14
26		1169	789		510	182					357	4
27		1209	840		614	215					373	9
28		1242	893		680	250					368	10
29		1317	896		707	226					462	11
30		921	916		768	253					501	14
31			904		816	284					450	15
32			948		965	300					530	21
33			1001		834	311					515	19
34			1026		805	328					550	22
35			1127		716	377					549	21
36					796	366					557	20
37					706	447					578	28
38					630	490					592	40
39					525	497					626	34
40					488	508					634	44
41					423	469					658	50
42					356	564					663	55
43					330	521					673	62
44					285	547					658	66

Table D-1. (Continued)

Raw Score Frequencies

	GS	AR	WK	PC	NO	CS	AS	MK	MC	EI	VE	AFQT
45					265	612					683	61
46					244	607					726	75
47					292	543					712	52
48					394	513					737	73
49					468	510					770	69
50					534	512					639	96
51						521						97
52						513						89
53						470						97
54						409						108
55						408						109
56						496						112
57						290						130
58						283						137
59						266						125
60						236						131
61						222						145
62						196						155
63						194						148
64						145						157
65						131						136
66						124						163
67						119						154
68						80						169
69						77						142
70						73						157
71						56						168
72						55						156
73						48						184
74						40						166
75						31						159
76						25						158
77						34						190
78						30						146
79						14						153
80						19						162
81						22						197
82						25						166
83						20						161
84						46						170
85												169
86												149
87												160
88												144
89												142

Table D-1. (Concluded)

Raw Score Frequencies

	GS	AR	WK	PC	NO	CS	AS	MK	MC	EI	VE	AFQT
90												175
91												153
92												155
93												147
94												168
95												125
96												122
97												127
98												81
99												78
100												66
101												72
102												46
103												39
104												43
105												23

Table D-2. Test RTC-1 (370)

Raw Score Frequencies

	CS	AR	WK	PC	NO	CS	AS	MK	MC	EI	VE	AFQT
0	0	0	0	0	0	0	1	1	1	0	0	0
1	0	0	0	2	1	0	1	4	2	2	0	0
2	0	0	0	13	0	0	4	22	2	10	0	0
3	2	1	0	25	0	0	8	35	8	7	0	0
4	0	2	0	38	0	2	18	59	14	16	0	0
5	5	7	2	58	1	1	40	96	23	33	0	0
6	8	23	2	99	1	4	37	90	35	67	0	0
7	14	21	2	132	1	2	61	111	61	83	0	0
8	25	35	7	148	2	1	80	146	72	108	1	0
9	43	45	6	196	1	1	75	112	80	124	0	0
10	57	65	12	204	3	1	82	121	98	164	2	0
11	93	62	12	223	3	1	86	118	123	189	4	0
12	105	75	17	203	7	3	87	118	122	147	2	0
13	124	89	27	229	11	1	105	103	129	179	4	0
14	128	94	13	250	8	5	118	115	140	150	9	0
15	150	99	19	220	9	5	119	85	101	166	10	0
16	139	99	26		11	4	110	92	140	153	4	0
17	188	92	44		10	10	115	85	146	158	8	0
18	152	98	53		24	3	111	94	129	125	16	0
19	156	125	57		29	7	138	71	114	101	14	0
20	139	104	57		38	16	159	74	117	58	15	0
21	137	110	72		40	11	141	76	127		19	2
22	107	111	77		33	21	137	72	95		19	0
23	113	99	74		53	10	120	71	86		20	0
24	92	83	91		57	16	73	37	50		25	0
25	63	111	90		64	20	14	32	25		44	1
26		108	114		59	20					42	0
27		82	115		63	22					34	1
28		83	108		71	28					60	0
29		70	137		66	19					47	2
30		47	137		69	23					51	4
31			164		115	22					54	3
32			135		88	35					49	1
33			137		98	38					58	3
34			132		82	35					83	2
35			101		83	35					89	2
36					75	40					85	8
37					77	49					84	3
38					70	38					72	5
39					80	29					86	4
40					65	60					94	8
41					49	49					84	8
42					39	55					79	5
43					43	53					107	9
44					39	68					88	11

Table D-2. (Continued)

Raw Score Frequencies

	GS	AR	WK	PC	NO	CS	AS	MK	MC	EI	VE	AFQT
45					48	60					82	7
46					38	62					96	12
47					48	52					98	15
48					64	52					94	14
49					61	60					64	15
50					43	46					44	8
51						44						17
52						66						18
53						62						21
54						49						20
55						52						28
56						61						27
57						53						32
58						42						33
59						42						43
60						41						29
61						25						33
62						27						29
63						30						44
64						28						49
65						26						43
66						28						45
67						21						38
68						18						44
69						12						43
70						19						39
71						15						55
72						9						49
73						10						61
74						8						49
75						6						43
76						5						39
77						2						48
78						6						45
79						7						37
80						6						46
81						3						50
82						4						40
83						11						38
84						7						61
85												47
86												53
87												50
88												37
89												33

Table D-2. (Concluded)

Raw Score Frequencies

	GS	AR	WK	PC	NO	CS	AS	MK	MC	EI	VE	AFQT
90												47
91												38
92												24
93												32
94												30
95												33
96												25
97												18
98												20
99												23
100												17
101												7
102												7
103												4
104												3
105												3

APPENDIX E: AIR FORCE
OPERATIONAL CONVERSION TABLES FOR ASVAB FORMS 11/12/13
USING THE 1980 YOUTH POPULATION

Note: Conversion tables for other, auxilliary operational tests (ASVABs 10x, 10y, 13c) are also included here, as is the conversion table for ASVAB 14, the high school test, in the interest of completeness.

Table E-1. Conversion of Raw Test Scores to Standard Scores

30 March 1984

RAW	GS	AR	WK	PC	MC	CS	RAW
0	22	26	21	21	20	21	0
1	24	26	22	24	20	22	1
2	25	28	23	27	20	22	2
3	27	29	24	29	20	23	3
4	29	30	25	32	20	24	4
5	31	32	26	35	20	24	5
6	32	33	27	37	20	25	6
7	34	34	29	40	21	25	7
8	36	35	30	42	22	26	8
9	38	37	31	45	23	27	9
10	39	38	32	48	24	27	10
11	41	39	33	50	25	28	11
12	43	41	34	53	26	28	12
13	45	42	36	56	27	29	13
14	46	43	37	58	28	30	14
15	48	44	38	61	29	30	15
16	50	46	39		30	31	16
17	51	47	40		31	31	17
18	53	48	41		32	32	18
19	55	50	43		33	33	19
20	57	51	44		34	33	20
21	58	52	45		35	34	21
22	60	53	46		36	35	22
23	62	55	47		36	35	23
24	64	56	48		37	36	24
25	65	57	50		38	36	25
26		59	51		39	37	26
27		60	52		40	38	27
28		61	53		41	38	28
29		62	54		42	39	29
30		64	55		43	39	30
31			57		44	40	31
32			58		45	41	32
33			59		46	41	33
34			60		47	42	34
35			61		48	42	35
36					49	43	36
37					50	44	37
38					51	44	38
39					52	45	39
40					53	45	40
41					54	46	41
42					55	47	42
43					56	47	43
44					57	48	44

RAW	GS	AR	WK	PC	NO	CS	RAW
45					58	49	45
46					59	49	46
47					60	50	47
48					61	50	48
49					62	51	49
50					63	52	50
51						52	51
52						53	52
53						53	53
54						54	54
55						55	55
56						55	56
57						56	57
58						56	58
59						57	59
60						58	60
61						58	61
62						59	62
63						60	63
64						60	64
65						61	65
66						61	66
67						62	67
68						63	68
69						63	69
70						64	70
71						64	71
72						65	72
73						66	73
74						66	74
75						67	75
76						67	76
77						68	77
78						69	78
79						69	79
80						70	80
81						71	81
82						71	82
83						72	83
84						72	84

Table E-1. (Concluded)

30 March 1984

RAW	AS	MK	MC	EI	VE	RAW	RAW	AS	MK	MC	EI	VE	RAW
0	26	31	24	26	20	0	25	68	67	69		41	25
1	27	32	24	28	21	1	26					41	26
2	29	34	25	30	21	2	27					42	27
3	31	35	27	32	22	3	28					43	28
4	32	36	29	34	23	4	29					44	29
5	34	38	31	37	24	5	30					45	30
6	36	39	33	39	25	6	31					46	31
7	37	41	35	41	26	7	32					46	32
8	39	42	37	43	26	8	33					47	33
9	41	44	38	45	27	9	34					48	34
10	42	45	40	48	28	10	35					49	35
11	44	47	42	50	29	11	36					50	36
12	46	48	44	52	30	12	37					51	37
13	47	49	46	54	31	13	38					51	38
14	49	51	48	56	31	14	39					52	39
15	51	52	50	58	32	15	40					53	40
16	53	54	52	61	33	16	41					54	41
17	54	55	54	63	34	17	42					55	42
18	56	57	55	65	35	18	43					56	43
19	58	58	57	67	36	19	44					56	44
20	59	60	59	69	36	20	45					57	45
21	61	61	61		37	21	46					58	46
22	63	63	63		38	22	47					59	47
23	64	64	65		39	23	48					60	48
24	66	65	67		40	24	49					61	49
							50					61	50

Table E-2. ASVAB 12a Conversion of Raw Test Scores to Standard Scores

30 March 1984

RAW	GS	AR	WK	PC	NO	CS	RAW
0	20	26	21	22	20	22	0
1	22	26	22	25	20	23	1
2	24	26	23	27	20	23	2
3	26	28	24	30	21	24	3
4	28	29	25	33	22	25	4
5	30	30	26	35	22	25	5
6	31	32	28	38	23	26	6
7	33	33	29	41	24	26	7
8	35	35	30	43	25	27	8
9	37	36	31	46	26	27	9
10	39	37	32	49	27	28	10
11	41	39	33	51	28	29	11
12	43	40	35	54	29	29	12
13	45	42	36	57	30	30	13
14	46	43	37	59	31	30	14
15	48	44	38	62	32	31	15
16	50	46	39		33	32	16
17	52	47	40		34	32	17
18	54	49	42		35	33	18
19	56	50	43		36	33	19
20	58	51	44		37	34	20
21	59	53	45		37	35	21
22	61	54	46		38	35	22
23	63	56	47		39	36	23
24	65	57	49		40	36	24
25	67	58	50		41	37	25
26		60	51		42	37	26
27		61	52		43	38	27
28		63	53		44	39	28
29		64	54		45	39	29
30		65	56		46	40	30
31			57		47	40	31
32			58		48	41	32
33			59		49	42	33
34			60		50	42	34
35			61		51	43	35
36					51	43	36
37					52	44	37
38					53	44	38
39					54	45	39
40					55	46	40
41					56	46	41
42					57	47	42
43					58	47	43
44					59	48	44
45					60	49	45
46					61	49	46
47					62	50	47
48					63	50	48
49					64	51	49
50					65	52	50
51						52	51
52						53	52
53						53	53
54						54	54
55						54	55
56						55	56
57						56	57
58						56	58
59						57	59
60						57	60
61						58	61
62						59	62
63						59	63
64						60	64
65						60	65
66						61	66
67						61	67
68						62	68
69						63	69
70						63	70
71						64	71
72						64	72
73						65	73
74						66	74
75						66	75
76						67	76
77						67	77
78						68	78
79						68	79
80						69	80
81						70	81
82						70	82
83						71	83
84						71	84

Table E-2. (Concluded)

30 March 1984

RAW	AS	MK	MC	EI	VE	RAW	RAW	AS	MK	MC	EI	VE	RAW
0	27	31	24	23	20	0	25	69	67	70		41	25
1	29	33	24	26	21	1	26					41	26
2	31	34	26	28	21	2	27					43	27
3	32	35	28	30	22	3	28					43	28
4	34	37	30	32	23	4	29					44	29
5	36	38	32	35	24	5	30					45	30
6	37	40	34	37	25	6	31					46	31
7	39	41	36	39	26	7	32					47	32
8	41	43	37	41	26	8	33					48	33
9	42	44	39	44	27	9	34					49	34
10	44	45	41	46	28	10	35					49	35
11	46	47	43	48	29	11	36					50	36
12	47	48	45	50	30	12	37					51	37
13	49	50	47	53	31	13	38					52	38
14	51	51	49	55	32		39					53	39
15	52	52	51	57	32	15	40					54	40
16	54	54	53	59	33	16	41					55	41
17	56	55	54	62	34	17	42					55	42
18	57	57	56	64	35	18	43					56	43
19	59	58	58	66	36	19	44					57	44
20	61	59	60	68	37	20	45					58	45
21	62	61	62		38	21	46					59	46
22	64	62	64		38	22	47					60	47
23	65	64	66		39	23	48					60	48
24	67	65	68		40	24	49					61	49
							50					62	50

Table E-3. ASVABs 10x/10y/13c/14
Conversion of Raw Test Scores
to Standard Scores

30 March 1984

MK	GS	AR	WK	PC	MO	CS	RAW
0	20	26	20	20	20	22	0
1	20	27	20	20	20	22	1
2	22	28	20	23	20	23	2
3	24	30	20	26	20	23	3
4	26	31	21	29	20	24	4
5	28	32	22	32	20	25	5
6	30	34	24	35	21	25	6
7	32	35	25	38	22	26	7
8	34	36	26	41	23	26	8
9	36	38	28	44	24	27	9
10	38	39	29	47	25	28	10
11	40	40	30	50	26	28	11
12	42	42	31	53	27	29	12
13	44	43	33	56	28	29	13
14	46	45	34	59	28	30	14
15	48	46	35	62	29	31	15
16	50	47	37		30	31	16
17	52	49	38		31	32	17
18	54	50	39		32	32	18
19	56	51	41		33	33	19
20	58	53	42		34	34	20
21	60	54	43		35	34	21
22	62	55	44		36	35	22
23	64	57	46		37	35	23
24	66	58	47		38	36	24
25	68	59	48		39	37	25
26		61	50		40	37	26
27		62	51		41	38	27
28		64	52		41	38	28
29		65	54		42	39	29
30		66	55		43	39	30
31			56		44	40	31
32			57		45	41	32
33			59		46	41	33
34			60		47	42	34
35			61		48	42	35
36					49	43	36
37					50	44	37
38					51	44	38
39					52	45	39
40					53	45	40
41					53	46	41
42					54	47	42
43					55	47	43
44					56	48	44

RAW	GS	AR	WK	PC	NO	CS	RAW
45					57	48	45
46					58	49	46
47					59	50	47
48					60	50	48
49					61	51	49
50					62	51	50
51						52	51
52						53	52
53						53	53
54						54	54
55						54	55
56						55	56
57						56	57
58						56	58
59						57	59
60						57	60
61						58	61
62						59	62
63						59	63
64						60	64
65						60	65
66						61	66
67						62	67
68						62	68
69						63	69
70						63	70
71						64	71
72						65	72
73						65	73
74						66	74
75						66	75
76						67	76
77						68	77
78						68	78
79						69	79
80						69	80
81						70	81
82						71	82
83						71	83
84						72	84

Table E-3. (Concluded)

30 March 1984

RAW	AS	MK	MC	EI	VE	RAW
0	24	29	24	23	20	0
1	26	30	25	25	20	1
2	28	32	27	27	20	2
3	30	33	29	30	20	3
4	31	35	31	32	20	4
5	33	37	33	34	20	5
6	35	38	35	37	20	6
7	37	40	37	39	21	7
8	39	41	38	42	22	8
9	40	43	40	44	23	9
10	42	44	42	46	24	10
11	44	46	44	49	25	11
12	46	48	46	51	26	12
13	48	49	48	53	27	13
14	49	51	50	56	28	14
15	51	52	52	58	29	15
16	53	54	53	60	30	16
17	55	55	55	63	31	17
18	57	57	57	65	32	18
19	58	58	59	68	33	19
20	60	60	61	70	34	20
21	62	62	63		35	21
22	64	63	65		36	22
23	66	65	67		37	23
24	67	66	68		37	24

RAW	AS	MK	MC	EI	VE	RAW
25	69	68	70		38	25
26					39	26
27					40	27
28					41	28
29					42	29
30					43	30
31					44	31
32					45	32
33					46	33
34					47	34
35					48	35
36					49	36
37					50	37
38					51	38
39					52	39
40					53	40
41					54	41
42					54	42
43					55	43
44					56	44
45					57	45
46					58	46
47					59	47
48					60	48
49					61	49
50					62	50

Table E-4. Armed Forces Qualification Test (AFQT)
ASVABs 11a/11b/12a/12b/13a/13b
1980 Percentile Equivalents

30 March 1984

RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE
0.0	1	21.5	2	43.0	12	64.5	30	86.0	64
0.5	1	22.0	2	43.5	12	65.0	31	86.5	65
1.0	1	22.5	2	44.0	13	65.5	32	87.0	66
1.5	1	23.0	2	44.5	13	66.0	32	87.5	67
2.0	1	23.5	3	45.0	13	66.5	33	88.0	68
2.5	1	24.0	3	45.5	14	67.0	34	88.5	69
3.0	1	24.5	3	46.0	14	67.5	34	89.0	70
3.5	1	25.0	3	46.5	14	68.0	35	89.5	71
4.0	1	25.5	3	47.0	15	68.5	36	90.0	72
4.5	1	26.0	3	47.5	15	69.0	36	90.5	73
5.0	1	26.5	4	48.0	15	69.5	37	91.0	74
5.5	1	27.0	4	48.5	16	70.0	38	91.5	75
6.0	1	27.5	4	49.0	16	70.5	38	92.0	76
6.5	1	28.0	4	49.5	16	71.0	39	92.5	77
7.0	1	28.5	4	50.0	17	71.5	40	93.0	78
7.5	1	29.0	5	50.5	17	72.0	41	93.5	79
8.0	1	29.5	5	51.0	18	72.5	41	94.0	80
8.5	1	30.0	5	51.5	18	73.0	42	94.5	81
9.0	1	30.5	5	52.0	18	73.5	43	95.0	81
9.5	1	31.0	5	52.5	19	74.0	44	95.5	82
10.0	1	31.5	6	53.0	19	74.5	44	96.0	83
10.5	1	32.0	6	53.5	20	75.0	45	96.5	84
11.0	1	32.5	6	54.0	20	75.5	46	97.0	85
11.5	1	33.0	6	54.5	21	76.0	47	97.5	86
12.0	1	33.5	7	55.0	21	76.5	47	98.0	87
12.5	1	34.0	7	55.5	21	77.0	48	98.5	87
13.0	1	34.5	7	56.0	22	77.5	49	99.0	88
13.5	1	35.0	7	56.5	22	78.0	49	99.5	89
14.0	1	35.5	7	57.0	23	78.5	50	100.0	90
14.5	1	36.0	8	57.5	23	79.0	51	100.5	91
15.0	1	36.5	8	58.0	24	79.5	52	101.0	92
15.5	1	37.0	8	58.5	24	80.0	53	101.5	93
16.0	1	37.5	9	59.0	25	80.5	53	102.0	93
16.5	1	38.0	9	59.5	25	81.0	54	102.5	94
17.0	1	38.5	9	60.0	26	81.5	55	103.0	95
17.5	1	39.0	10	60.5	26	82.0	56	103.5	96
18.0	1	39.5	10	61.0	27	82.5	57	104.0	97
18.5	1	40.0	10	61.5	27	83.0	58	104.5	97
19.0	2	40.5	11	62.0	27	83.5	59	105.0	98
19.5	2	41.0	11	62.5	28	84.0	60		
20.0	2	41.5	11	63.0	28	84.5	61		
20.5	2	42.0	11	63.5	29	85.0	62		
21.0	2	42.5	12	64.0	30	85.5	63		

Table E-5. Armed Forces Qualification Test (AFQT)
ASVAB 12a 1980 Percentile Equivalents

30 March 1984

RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE
0.0	1	21.5	2	43.0	13	64.5	32	86.0	70
0.5	1	22.0	2	43.5	13	65.0	33	86.5	71
1.0	1	22.5	2	44.0	13	65.5	34	87.0	72
1.5	1	23.0	2	44.5	14	66.0	35	87.5	73
2.0	1	23.5	3	45.0	14	66.5	36	88.0	74
2.5	1	24.0	3	45.5	14	67.0	36	88.5	75
3.0	1	24.5	3	46.0	15	67.5	37	89.0	76
3.5	1	25.0	3	46.5	15	68.0	38	89.5	77
4.0	1	25.5	3	47.0	15	68.5	38	90.0	78
4.5	1	26.0	3	47.5	16	69.0	39	90.5	79
5.0	1	26.5	4	48.0	16	69.5	40	91.0	80
5.5	1	27.0	4	48.5	16	70.0	41	91.5	80
6.0	1	27.5	4	49.0	17	70.5	42	92.0	81
6.5	1	28.0	4	49.5	17	71.0	42	92.5	82
7.0	1	28.5	4	50.0	18	71.5	43	93.0	83
7.5	1	29.0	5	50.5	18	72.0	44	93.5	84
8.0	1	29.5	5	51.0	18	72.5	45	94.0	85
8.5	1	30.0	5	51.5	19	73.0	45	94.5	86
9.0	1	30.5	5	52.0	19	73.5	46	95.0	87
9.5	1	31.0	6	52.5	20	74.0	47	95.5	88
10.0	1	31.5	6	53.0	20	74.5	47	96.0	89
10.5	1	32.0	6	53.5	21	75.0	48	96.5	90
11.0	1	32.5	6	54.0	21	75.5	49	97.0	90
11.5	1	33.0	6	54.5	22	76.0	50	97.5	91
12.0	1	33.5	7	55.0	22	76.5	50	98.0	92
12.5	1	34.0	7	55.5	23	77.0	51	98.5	93
13.0	1	34.5	7	56.0	23	77.5	52	99.0	94
13.5	1	35.0	7	56.5	24	78.0	53	99.5	95
14.0	1	35.5	8	57.0	24	78.5	54	100.0	96
14.5	1	36.0	8	57.5	25	79.0	55	100.5	96
15.0	1	36.5	8	58.0	25	79.5	56	101.0	97
15.5	1	37.0	9	58.5	26	80.0	57	101.5	98
16.0	1	37.5	9	59.0	26	80.5	58	102.0	98
16.5	1	38.0	9	59.5	27	81.0	59	102.5	99
17.0	1	38.5	10	60.0	27	81.5	60	103.0	99
17.5	1	39.0	10	60.5	28	82.0	61	103.5	99
18.0	1	39.5	10	61.0	28	82.5	63	104.0	99
18.5	1	40.0	11	61.5	29	83.0	64	104.5	99
19.0	1	40.5	11	62.0	29	83.5	65	105.0	99
19.5	1	41.0	11	62.5	30	84.0	66		
20.0	2	41.5	12	63.0	31	84.5	67		
20.5	2	42.0	12	63.5	31	85.0	68		
21.0	2	42.5	12	64.0	32	85.5	69		

Table E-6. Armed Forces Qualification Test (AFQT)
ASVABs 10x/10y/13c/14
1980 Percentile Equivalents

30 March 1984

RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE	RAW AFQT SCORE	PERCENTILE
0.0	1	21.5	1	43.0	11	64.5	30	86.0	67
0.5	1	22.0	1	43.5	11	65.0	30	86.5	68
1.0	1	22.5	1	44.0	11	65.5	31	87.0	69
1.5	1	23.0	1	44.5	12	66.0	32	87.5	70
2.0	1	23.5	1	45.0	12	66.5	32	88.0	71
2.5	1	24.0	2	45.5	12	67.0	33	88.5	72
3.0	1	24.5	2	46.0	13	67.5	34	89.0	73
3.5	1	25.0	2	46.5	13	68.0	35	89.5	74
4.0	1	25.5	2	47.0	13	68.5	35	90.0	75
4.5	1	26.0	2	47.5	14	69.0	36	90.5	76
5.0	1	26.5	2	48.0	14	69.5	37	91.0	77
5.5	1	27.0	2	48.5	14	70.0	38	91.5	78
6.0	1	27.5	3	49.0	15	70.5	38	92.0	79
6.5	1	28.0	3	49.5	15	71.0	39	92.5	80
7.0	1	28.5	3	50.0	16	71.5	40	93.0	81
7.5	1	29.0	3	50.5	16	72.0	41	93.5	82
8.0	1	29.5	3	51.0	16	72.5	42	94.0	83
8.5	1	30.0	4	51.5	17	73.0	42	94.5	84
9.0	1	30.5	4	52.0	17	73.5	43	95.0	85
9.5	1	31.0	4	52.5	17	74.0	44	95.5	86
10.0	1	31.5	4	53.0	18	74.5	45	96.0	87
10.5	1	32.0	4	53.5	18	75.0	46	96.5	88
11.0	1	32.5	5	54.0	19	75.5	46	97.0	89
11.5	1	33.0	5	54.5	19	76.0	47	97.5	90
12.0	1	33.5	5	55.0	20	76.5	48	98.0	91
12.5	1	34.0	5	55.5	20	77.0	49	98.5	92
13.0	1	34.5	6	56.0	21	77.5	49	99.0	93
13.5	1	35.0	6	56.5	21	78.0	50	99.5	94
14.0	1	35.5	6	57.0	22	78.5	51	100.0	94
14.5	1	36.0	6	57.5	22	79.0	52	100.5	95
15.0	1	36.5	6	58.0	23	79.5	53	101.0	96
15.5	1	37.0	7	58.5	23	80.0	54	101.5	97
16.0	1	37.5	7	59.0	24	80.5	55	102.0	98
16.5	1	38.0	7	59.5	24	81.0	56	102.5	98
17.0	1	38.5	8	60.0	25	81.5	57	103.0	99
17.5	1	39.0	8	60.5	25	82.0	58	103.5	99
18.0	1	39.5	8	61.0	26	82.5	59	104.0	99
18.5	1	40.0	8	61.5	26	83.0	60	104.5	99
19.0	1	40.5	9	62.0	27	83.5	62	105.0	99
19.5	1	41.0	9	62.5	27	84.0	63		
20.0	1	41.5	10	63.0	28	84.5	64		
20.5	1	42.0	10	63.5	28	85.0	65		
21.0	1	42.5	10	64.0	29	85.5	66		

APPENDIX F: US ARMY
CONVERSION TABLES ASVABs 11/12/13/14
1980 COMPOSITE SCORE EQUIVALENTS

Note: Conversion tables follow for this Laboratory's versions of Army Composites CL, MM, SC, CO, FA, and OF. Composites GT, GM, EL, and ST were previously provided by the Center for Naval Analyses and are available in Maier, M. H., and Sims, W. H. (1982). Constructing an ASVAB score scale in the 1980 Reference Population. Center for Naval Analyses Report 82-3118.

Table F-1. Conversion of Sum of Subtest Standard Scores (SSS) To Army Standard Scores (SS) Adjusted CL Composite (CL = NO + CS + VE)

SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS
60	31	109	69	158	106	199	138
61	32	110	69	159	107	200	138
62	33	111	70	160	108	201	139
63	33	112	71	161	108	202	140
64	34	113	72	162	109	203	141
65	35	114	72	163	110	204	141
66	36	115	73	164	111	205	142
67	36	116	74	165	112	206	143
68	37	117	75	166	112	207	144
69	38	118	76	167	113	208	145
70	39	119	76	168	114	209	145
71	39	120	77	169	115	210	146
72	40	121	78	170	115	211	147
73	41	122	79	171	116	212	148
74	42	123	79	172	117	213	148
75	43	124	80	173	118	214	149
76	43	125	81	174	118	215	150
77	44	126	82	175	119	216	151
78	45	127	82	176	120	217	151
79	46	128	83	177	121	218	152
80	46	129	84	178	122	219	153
81	47	130	85	179	122	220	154
82	48	131	85	180	123	221	154
83	49	132	86	181	124	222	155
84	49	133	87	182	125	223	156
85	50	134	88	183	125	224	157
86	51	135	89	184	126	225	158
87	52	136	89	185	127	226	158
88	52	137	90	186	128	227	159
89	53	138	91	187	128	228	160
90	54	139	92	188	129	229	161
91	55	140	92	189	130	230	161
92	56	141	93	190	131	231	162
93	56	142	94	191	131	232	163
94	57	143	95	192	132	233	164
95	58	144	95	193	133	234	164
96	59	145	96	194	134	235	165
97	59	146	97	195	135	236	166
98	60	147	98	196	135	237	167
99	61	148	99	197	136	238	168
100	62	149	99	198	137	239	168
101	62	150	100			240	169
102	63	151	101				
103	64	152	102				
104	65	153	102				
105	66	154	103				
106	66	155	104				
107	67	156	105				
108	68	157	105				

Table F-2. Conversion of Sum of Subtest Standard Scores (SSS)
To Army Standard Scores (SS)
Adjusted MM Composite (MM = NO + AS + MC + EI)

SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS
80	27	131	58	182	89	233	120
81	27	132	58	183	90	234	121
82	28	133	59	184	90	235	121
83	28	134	60	185	91	236	122
84	29	135	60	186	92	237	123
85	30	136	61	187	92	238	123
86	30	137	62	188	93	239	124
87	31	138	62	189	93	240	125
88	32	139	63	190	94	241	125
89	32	140	63	191	95	242	126
90	33	141	64	192	95	243	126
91	33	142	65	193	96	244	127
92	34	143	65	194	96	245	128
93	35	144	66	195	97	246	128
94	35	145	66	196	98	247	129
95	36	146	67	197	98	248	129
96	36	147	68	198	99	249	130
97	37	148	68	199	99	250	131
98	38	149	69	200	100	251	131
99	38	150	69	201	101	252	132
100	39	151	70	202	101	253	133
101	40	152	71	203	102	254	133
102	40	153	71	204	103	255	134
103	41	154	72	205	103	256	134
104	41	155	73	206	104	257	135
105	42	156	73	207	104	258	136
106	43	157	74	208	105	259	136
107	43	158	74	209	106	260	137
108	44	159	75	210	106	261	137
109	44	160	76	211	107	262	138
110	45	161	76	212	107	263	139
111	46	162	77	213	108	264	139
112	46	163	77	214	109	265	140
113	47	164	78	215	109	266	140
114	47	165	79	216	110	267	141
115	48	166	79	217	110	268	142
116	49	167	80	218	111	269	142
117	49	168	81	219	112	270	143
118	50	169	81	220	112	271	144
119	51	170	82	221	113	272	144
120	51	171	82	222	114	273	145
121	52	172	83	223	114	274	145
122	52	173	84	224	115	275	146
123	53	174	84	225	115	276	147
124	54	175	85	226	116	277	147
125	54	176	85	227	117	278	148
126	55	177	86	228	117	279	148
127	55	178	87	229	118	280	149
128	56	179	87	230	118	281	150
129	57	180	88	231	119	282	150
130	57	181	88	232	120	283	151

Table F-2. (Concluded)

SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS
284	151	294	158	304	164	314	170
285	152	295	158	305	164	315	170
286	153	296	159	306	165	316	171
287	153	297	159	307	166	317	172
288	154	298	160	308	166	318	172
289	155	299	161	309	167	319	173
290	155	300	161	310	167	320	173
291	156	301	162	311	168		
292	156	302	162	312	169		
293	157	303	163	313	169		

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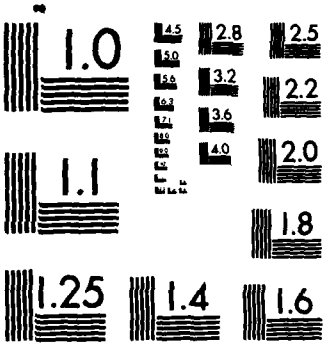

MICROCOPY RESOLUTION TEST CHART
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Table F-3. Conversion of Sum of Subtest Standard Scores (SSS) To Army Standard Scores (SS) Adjusted SC Composite (SC = NO + CS + AS + VE)

SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS
80	24	131	56	182	89	233	121
81	24	132	57	183	89	234	122
82	25	133	57	184	90	235	122
83	26	134	58	185	91	236	123
84	26	135	59	186	91	237	124
85	27	136	59	187	92	238	124
86	28	137	60	188	92	239	125
87	28	138	61	189	93	240	125
88	29	139	61	190	94	241	126
89	29	140	62	191	94	242	127
90	30	141	63	192	95	243	127
91	31	142	63	193	96	244	128
92	31	143	64	194	96	245	129
93	32	144	64	195	97	246	129
94	33	145	65	196	98	247	130
95	33	146	66	197	98	248	131
96	34	147	66	198	99	249	131
97	35	148	67	199	99	250	132
98	35	149	68	200	100	251	132
99	36	150	68	201	101	252	133
100	36	151	69	202	101	253	134
101	37	152	70	203	102	254	134
102	38	153	70	204	103	255	135
103	38	154	71	205	103	256	136
104	39	155	71	206	104	257	136
105	40	156	72	207	105	258	137
106	40	157	73	208	105	259	138
107	41	158	73	209	106	260	138
108	42	159	74	210	106	261	139
109	42	160	75	211	107	262	139
110	43	161	75	212	108	263	140
111	43	162	76	213	108	264	141
112	44	163	77	214	109	265	141
113	45	164	77	215	110	266	142
114	45	165	78	216	110	267	143
115	46	166	78	217	111	268	143
116	47	167	79	218	112	269	144
117	47	168	80	219	112	270	145
118	48	169	80	220	113	271	145
119	49	170	81	221	113	272	146
120	49	171	82	222	114	273	146
121	50	172	82	223	115	274	147
122	50	173	83	224	115	275	148
123	51	174	84	225	116	276	148
124	52	175	84	226	117	277	149
125	52	176	85	227	117	278	150
126	53	177	85	228	118	279	150
127	54	178	86	229	118	280	151
128	54	179	87	230	119	281	152
129	55	180	87	231	120	282	152
130	56	181	88	232	120	283	153

Table F-3. (Concluded)

SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS
284	153	293	159	302	165	311	171
285	154	294	160	303	166	312	171
286	155	295	160	304	166	313	172
287	155	296	161	305	167	314	173
288	156	297	162	306	167	315	173
289	157	298	162	307	168	316	174
290	157	299	163	308	169	317	174
291	158	300	164	309	169	318	175
292	159	301	164	310	170	319	176
						320	176

Table F-4 Conversion of Sum of Subtest Standard Scores (SSS)
To Army Standard Scores (SS)
Adjusted CO Composite (CO = CS + AR + MC + AS)

SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS
80	24	129	55	178	86	227	117
81	25	130	56	179	87	228	118
82	26	131	57	180	87	229	118
83	26	132	57	181	88	230	119
84	27	133	58	182	89	231	120
85	28	134	58	183	89	232	120
86	28	135	59	184	90	233	121
87	29	136	60	185	91	234	122
88	29	137	60	186	91	235	122
89	30	138	61	187	92	236	123
90	31	139	62	188	93	237	123
91	31	140	62	189	93	238	124
92	32	141	63	190	94	239	125
93	33	142	63	191	94	240	125
94	33	143	64	192	95	241	126
95	34	144	65	193	96	242	127
96	34	145	65	194	96	243	127
97	35	146	66	195	97	244	128
98	36	147	67	196	98	245	128
99	36	148	67	197	98	246	129
100	37	149	68	198	99	247	130
101	38	150	69	199	99	248	130
102	38	151	69	200	100	249	131
103	39	152	70	201	101	250	132
104	40	153	70	202	101	251	132
105	40	154	71	203	102	252	133
106	41	155	72	204	103	253	134
107	41	156	72	205	103	254	134
108	42	157	73	206	104	255	135
109	43	158	74	207	104	256	135
110	43	159	74	208	105	257	136
111	44	160	75	209	106	258	137
112	45	161	75	210	106	259	137
113	45	162	76	211	107	260	138
114	46	163	77	212	108	261	139
115	46	164	77	213	108	262	139
116	47	165	78	214	109	263	140
117	48	166	79	215	110	264	140
118	48	167	79	216	110	265	141
119	49	168	80	217	111	266	142
120	50	169	81	218	111	267	142
121	50	170	81	219	112	268	143
122	51	171	82	220	113	269	144
123	51	172	82	221	113	270	144
124	52	173	83	222	114	271	145
125	53	174	84	223	115	272	146
126	53	175	84	224	115	273	146
127	54	176	85	225	116	274	147
128	55	177	86	226	116	275	147

Table F-4. (Concluded)

SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS
276	148	287	155	298	162	309	169
277	149	288	156	299	163	310	169
278	149	289	156	300	163	311	170
279	150	290	157	301	164	312	171
280	151	291	158	302	164	313	171
281	151	292	158	303	165	314	172
282	152	293	159	304	166	315	173
283	152	294	159	305	166	316	173
284	153	295	160	306	167	317	174
285	154	296	161	307	168	318	175
286	154	297	161	308	168	319	175
						320	176

Table F-5 Conversion of Sum of Subtest Standard Scores (SSS)
To Army Standard Scores (SS)
Adjusted FA Composite (FA = AK + CS + MC + MK)

SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS
80	28	131	58	182	89	233	120
81	28	132	59	183	90	234	121
82	29	133	60	184	90	235	121
83	29	134	60	185	91	236	122
84	30	135	61	186	92	237	122
85	31	136	61	187	92	238	123
86	31	137	62	188	93	239	124
87	32	138	63	189	93	240	124
88	32	139	63	190	94	241	125
89	33	140	64	191	95	242	125
90	34	141	64	192	95	243	126
91	34	142	65	193	96	244	127
92	35	143	66	194	96	245	127
93	35	144	66	195	97	246	128
94	36	145	67	196	98	247	129
95	37	146	67	197	98	248	129
96	37	147	68	198	99	249	130
97	38	148	69	199	99	250	130
98	38	149	69	200	100	251	131
99	39	150	70	201	101	252	132
100	40	151	70	202	101	253	132
101	40	152	71	203	102	254	133
102	41	153	72	204	103	255	133
103	41	154	72	205	103	256	134
104	42	155	73	206	104	257	135
105	43	156	73	207	104	258	135
106	43	157	74	208	105	259	136
107	44	158	75	209	106	260	136
108	44	159	75	210	106	261	137
109	45	160	76	211	107	262	138
110	46	161	77	212	107	263	138
111	46	162	77	213	108	264	139
112	47	163	78	214	109	265	139
113	47	164	78	215	109	266	140
114	48	165	79	216	110	267	141
115	49	166	80	217	110	268	141
116	49	167	80	218	111	269	142
117	50	168	81	219	112	270	142
118	51	169	81	220	112	271	143
119	51	170	82	221	113	272	144
120	52	171	83	222	113	273	144
121	52	172	83	223	114	274	145
122	53	173	84	224	115	275	145
123	54	174	84	225	115	276	146
124	54	175	85	226	116	277	147
125	55	176	86	227	116	278	147
126	55	177	86	228	117	279	148
127	56	178	87	229	118	280	148
128	57	179	87	230	118	281	149
129	57	180	88	231	119	282	150
130	58	181	89	232	119	283	150

Table F-5. (Concluded)

SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS
284	152	294	159	304	165	314	171
285	153	295	159	305	165	315	172
286	154	296	160	306	166	316	172
287	154	297	160	307	167	317	173
288	155	298	161	308	167	318	173
289	155	299	162	309	168	319	174
290	156	300	162	310	168	320	175
291	157	301	163	311	169		
292	157	302	163	312	170		
293	158	303	164	313	170		

Table F-6 Conversion of Sum of Subtest Standard Scores (SSS)
To Army Standard Scores (SS)
Adjusted FA composite (FA = AK + CS + MC + MK)

SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS
80	26	131	57	182	89	233	121
81	26	132	58	183	90	234	121
82	27	133	58	184	90	235	122
83	27	134	59	185	91	236	122
84	28	135	60	186	91	237	123
85	29	136	60	187	92	238	124
86	29	137	61	188	93	239	124
87	30	138	62	189	93	240	125
88	30	139	62	190	94	241	126
89	31	140	63	191	95	242	126
90	32	141	63	192	95	243	127
91	32	142	64	193	96	244	127
92	33	143	65	194	96	245	128
93	34	144	65	195	97	246	129
94	34	145	66	196	98	247	129
95	35	146	67	197	98	248	130
96	35	147	67	198	99	249	131
97	36	148	68	199	99	250	131
98	37	149	68	200	100	251	132
99	37	150	69	201	101	252	132
100	38	151	70	202	101	253	133
101	39	152	70	203	102	254	134
102	39	153	71	204	103	255	134
103	40	154	72	205	103	256	135
104	40	155	72	206	104	257	136
105	41	156	73	207	104	258	136
106	42	157	73	208	105	259	137
107	42	158	74	209	106	260	137
108	43	159	75	210	106	261	138
109	44	160	75	211	107	262	139
110	44	161	76	212	108	263	139
111	45	162	76	213	108	264	140
112	45	163	77	214	109	265	140
113	46	164	78	215	110	266	141
114	47	165	78	216	110	267	142
115	47	166	79	217	111	268	142
116	48	167	80	218	111	269	143
117	49	168	80	219	112	270	144
118	49	169	81	220	113	271	144
119	50	170	81	221	113	272	145
120	50	171	82	222	114	273	145
121	51	172	83	223	114	274	146
122	52	173	83	224	115	275	147
123	52	174	84	225	116	276	147
124	53	175	85	226	116	277	148
125	53	176	85	227	117	278	149
126	54	177	86	228	117	279	149
127	55	178	86	229	118	280	150
128	55	179	87	230	119	281	150
129	56	180	88	231	119	282	151
130	57	181	88	232	120	283	152

Table F-6. (Concluded)

SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS	SSS	ARMY SS
284	151	294	157	304	163	314	169
285	151	295	157	305	164	315	170
286	152	296	158	306	164	316	170
287	153	297	159	307	165	317	171
288	153	298	159	308	165	318	171
289	154	299	160	309	166	319	172
290	155	300	161	310	167	320	173
291	155	301	161	311	167		
292	156	302	162	312	168		
293	156	303	162	313	168		

APPENDIX G: US MARINE CORPS
CONVERSION TABLES ASVABs 11/12/13/14
1980 COMPOSITE SCORE EQUIVALENTS

Note: These tables were provided by the Center for Naval Analyses and have been verified by this Laboratory. Please see CNA Memorandum 84-0426, 14 March 1984 on Marine Corps Aptitude Composite Tables for ASVAB 8/9/10/11/12/13/14 in the 1980 Reference Population by W. H. Sims.

Table G-1. US Marine Corps Conversion Tables
ASVABs 11/12/13/14
1980 Composite Scores Equivalents

SSS	MM	CL	GT	EL	SSS
60-70		40	40		60-70
71		40	40		71
72		40	41		72
73		40	42		73
74		41	43		74
75		41	43		75
76		42	44		76
77		43	45		77
78		44	46		78
79		45	46		79
80	40	45	47	40	80
81	40	46	48	40	81
82	40	47	49	40	82
83	40	48	49	40	83
84	40	48	50	40	84
85	40	49	51	40	85
86	40	50	52	40	86
87	40	51	52	40	87
88	40	52	53	40	88
89	40	52	54	40	89
90	40	53	55	40	90
91	40	54	55	40	91
92	40	55	56	40	92
93	40	55	57	40	93
94	40	56	58	40	94
95	40	57	58	41	95
96	41	58	59	41	96
97	41	59	60	42	97
98	42	59	61	42	98
99	42	60	62	43	99
100	43	61	62	44	100
101	43	62	63	44	101
102	44	63	64	45	102
103	45	63	65	45	103
104	45	64	65	46	104
105	46	65	66	46	105
106	46	66	67	47	106
107	47	66	68	47	107
108	47	67	68	48	108
109	48	68	69	49	109
110	49	69	70	49	110
111	49	70	71	50	111
112	50	70	71	50	112
113	50	71	72	51	113
114	51	72	73	51	114

SSS	MM	CL	GT	EL	SSS
115	51	73	74	52	115
116	52	73	74	53	116
117	53	74	75	53	117
118	53	75	76	54	118
119	54	76	77	54	119
120	54	77	77	55	120
121	55	77	78	55	121
122	55	78	79	56	122
123	56	79	80	57	123
124	57	80	80	57	124
125	57	80	81	58	125
126	58	81	82	58	126
127	58	82	83	59	127
128	59	83	83	59	128
129	59	84	84	60	129
130	60	84	85	60	130
131	61	85	86	61	131
132	61	86	86	62	132
133	62	87	87	62	133
134	62	88	88	63	134
135	63	88	89	63	135
136	63	89	89	64	136
137	64	90	90	64	137
138	65	91	91	65	138
139	65	91	92	66	139
140	66	92	92	66	140
141	66	93	93	67	141
142	67	94	94	67	142
143	67	95	95	68	143
144	68	95	96	68	144
145	69	96	96	69	145
146	69	97	97	70	146
147	70	98	98	70	147
148	70	98	99	71	148
149	71	99	99	71	149
150	71	100	100	72	150
151	72	101	101	72	151
152	73	102	102	73	152
153	73	102	102	74	153
154	74	103	103	74	154
155	74	104	104	75	155
156	75	105	105	75	156
157	75	106	105	76	157
158	76	106	106	76	158
159	77	107	107	77	159

Table G-1. (Continued)

SSS	MM	CL	GT	EL	SSS
160	77	108	108	77	160
161	78	109	108	78	161
162	78	109	109	79	162
163	79	110	110	79	163
164	79	111	111	80	164
165	80	112	111	80	165
166	81	113	112	81	166
167	81	113	113	81	167
168	82	114	114	82	168
169	82	115	114	83	169
170	83	116	115	83	170
171	83	116	116	84	171
172	84	117	117	84	172
173	85	118	117	85	173
174	85	119	118	85	174
175	86	120	119	86	175
176	86	120	120	87	176
177	87	121	120	87	177
178	87	122	121	88	178
179	88	123	122	88	179
180	89	123	123	89	180
181	89	124	123	89	181
182	90	125	124	90	182
183	90	126	125	90	183
184	91	127	126	91	184
185	91	127	127	92	185
186	92	128	127	92	186
187	93	129	128	93	187
188	93	130	129	93	188
189	94	131	130	94	189
190	94	131	130	94	190
191	95	132	131	95	191
192	95	133	132	96	192
193	96	134	133	96	193
194	97	134	133	97	194
195	97	135	134	97	195
196	98	136	135	98	196
197	98	137	136	98	197
198	99	138	136	99	198
199	99	138	137	100	199
200	100	139	138	100	200
201	101	140	139	101	201
202	101	141	139	101	202
203	102	141	140	102	203
204	102	142	141	102	204

SSS	MM	CL	GT	EL	SSS
205	103	143	142	103	205
206	103	144	142	103	206
207	104	145	143	104	207
208	105	145	144	105	208
209	105	146	145	105	209
210	106	147	145	106	210
211	106	148	146	106	211
212	107	149	147	107	212
213	107	149	148	107	213
214	108	150	148	108	214
215	109	151	149	109	215
216	109	152	150	109	216
217	110	152	151	110	217
218	110	153	151	110	218
219	111	154	152	111	219
220	111	155	153	111	220
221	112	156	154	112	221
222	113	156	154	113	222
223	113	157	155	113	223
224	114	158	156	114	224
225	114	159	157	114	225
226	115	159	157	115	226
227	115	160	158	115	227
228	116	160	159	116	228
229	117	160	160	116	229
230	117	160	160	117	230
231	118	160	160	118	231
232	118	160	160	118	232
233	119	160	160	119	233
234	119	160	160	119	234
235	120	160	160	120	235
236	121	160	160	120	236
237	121	160	160	121	237
238	122	160	160	122	238
239	122	160	160	122	239
240	123	160	160	123	240
241	123			123	241
242	124			124	242
243	125			124	243
244	125			125	244
245	126			126	245
246	126			126	246
247	127			127	247
248	127			127	248
249	128			128	249

Table G-1. (Concluded)

SSS	MM	CL	GT	EL	SSS
250	129			128	250
251	129			129	251
252	130			130	252
253	130			130	253
254	131			131	254
255	131			131	255
256	132			132	256
257	133			132	257
258	133			133	258
259	134			133	259
260	134			134	260
261	135			135	261
262	135			135	262
263	136			136	263
264	137			136	264
265	137			137	265
266	138			137	266
267	138			138	267
268	139			139	268
269	139			139	269
270	140			140	270
271	141			140	271
272	141			141	272
273	142			141	273
274	142			142	274
275	143			143	275
276	143			143	276
277	144			144	277
278	145			144	278
279	145			145	279
280	146			145	280
281	146			146	281
282	147			146	282
283	147			147	283
284	148			148	284
285	149			148	285
286	149			149	286
287	150			149	287
288	150			150	288
289	151			150	289
290	151			151	290
291	152			152	291
292	153			152	292
293	153			153	293
294	154			153	294
295	154			154	295
296	155			154	296
297	155			155	297
298	156			156	298
299	157			156	299
300	157			157	300
301	158			157	301
302	158			158	302
303	159			158	303
304	159			159	304
305	160			159	305
306-320	160			160	306-320

APPENDIX H: US AIR FORCE APTITUDE COMPOSITES
ASVABs 11/12/13/14
1980 PERCENTILE SCORE EQUIVALENTS

Table H-1. US Air Force Aptitude Area Composites
ASVABs 11/12/13/14
1980 Percentile Score Equivalents
6 April 1984

SSS	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	SSS	SSS	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	SSS
40			1		40	80	1	2	18	1	80
41			1		41	81	1	2	19	1	81
42			1		42	82	1	2	20	1	82
43			1		43	83	1	2	21	1	83
44			1		44	84	1	2	22	1	84
45			1		45	85	1	3	23	1	85
46			1		46	86	1	3	25	1	86
47			1		47	87	1	3	26	1	87
48			1		48	88	1	3	27	1	88
49			1		49	89	1	3	29	1	89
50			1		50	90	1	4	30	1	90
51			1		51	91	1	4	32	1	91
52			1		52	92	1	4	33	1	92
53			1		53	93	1	4	34	1	93
54			1		54	94	1	4	36	1	94
55			1		55	95	1	5	37	1	95
56			1		56	96	1	5	39	1	96
57			1		57	97	1	5	41	1	97
58			1		58	98	1	5	42	1	98
59			2		59	99	1	6	44	1	99
60		1	2		60	100	1	6	46	1	100
61		1	3		61	101	1	6	48	1	101
62		1	3		62	102	1	6	50	1	102
63		1	4		63	103	1	7	52	1	103
64		1	4		64	104	1	7	53	1	104
65		1	5		65	105	1	7	55	1	105
66		1	5		66	106	1	8	57	1	106
67		1	6		67	107	1	8	59	1	107
68		1	7		68	108	1	8	62	1	108
69		1	8		69	109	1	9	64	1	109
70		1	9		70	110	1	9	66	1	110
71		1	9		71	111	1	10	68	1	111
72		1	10		72	112	1	10	70	1	112
73		1	11		73	113	1	11	72	1	113
74		1	12		74	114	1	11	74	1	114
75		1	13		75	115	1	11	76	1	115
76		1	14		76	116	1	12	78	1	116
77		1	15		77	117	1	12	80	1	117
78		1	16		78	118	1	13	82	1	118
79		2	17		79	119	1	13	84	1	119

Table H-1. (Continued)

SSS	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	SSS
120	1	14	85	1	120
121	1	14	87	1	121
122	1	15	89	1	122
123	1	15	91	1	123
124	1	16	93	1	124
125	1	17	95	1	125
126	1	17	97	1	126
127	1	18	98	1	127
128	1	19	99	1	128
129	2	20	(Thru SSS = 160)	1	129
130	2	20		1	130
131	2	21		1	131
132	2	22		1	132
133	2	23		2	133
134	3	24		2	134
135	3	25		2	135
136	3	26		2	136
137	4	27		3	137
138	4	28		3	138
139	4	29		4	139
140	5	30		4	140
141	5	31		4	141
142	5	32		5	142
143	6	34		5	143
144	6	35		6	144
145	7	36		6	145
146	7	37		7	146
147	8	39		8	147
148	8	40		8	148
149	9	41		9	149
150	9	43		9	150
151	10	45		10	151
152	11	46		11	152
153	11	48		11	153
154	12	50		12	154
155	12	51		13	155
156	13	53		13	156
157	13	54		14	157
158	14	56		14	158
159	15	58		15	159

SSS	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	SSS
160	15	60		16	160
161	16	61		17	161
162	17	63		17	162
163	18	65		18	163
164	18	67		19	164
165	19	68		19	165
166	20	70		20	166
167	21	72		21	167
168	21	74		22	168
169	22	76		22	169
170	23	77		23	170
171	24	79		24	171
172	25	80		25	172
173	26	82		26	173
174	26	83		27	174
175	27	85		28	175
176	28	86		29	176
177	29	87		30	177
178	30	89		31	178
179	31	90		32	179
180	32	92		32	180
181	33	93		33	181
182	34	94		34	182
183	35	95		35	183
184	36	95		36	184
185	37	96		37	185
186	38	97		38	186
187	39	98		39	187
188	40	98		40	188
189	40	99		41	189
190	41	(Thru SSS		42	190
191	42	= 240)		43	191
192	43			43	192
193	44			44	193
194	45			45	194
195	46			46	195
196	47			47	196
197	48			48	197
198	49			49	198
199	50			50	199

Table H-1. (Concluded)

SSS	MECH (M)	ADMIN (A)	GEN (G)	ELEC (E)	SSS
200	51			50	200
201	52			51	201
202	53			52	202
203	54			53	203
204	55			54	204
205	56			55	205
206	57			56	206
207	58			57	207
208	59			58	208
209	60			59	209
210	60			60	210
211	61			61	211
212	62			62	212
213	63			62	213
214	64			63	214
215	65			64	215
216	66			65	216
217	67			66	217
218	68			67	218
219	68			67	219
220	69			68	220
221	70			69	221
222	71			70	222
223	72			71	223
224	72			72	224
225	73			72	225
226	74			73	226
227	74			74	227
228	75			75	228
229	76			76	229
230	77			76	230
231	78			77	231
232	78			78	232
233	79			79	233
234	80			80	234
235	81			81	235
236	81			81	236
237	82			82	237
238	83			83	238
239	83			84	239
240	84			85	240
241	85			86	241
242	86			86	242
243	86			87	243
244	87			88	244
245	88			88	245
246	88			89	246
247	89			90	247
248	89			90	248
249	90			91	249
250	91			92	250
251	91			92	251
252	92			93	252
253	92			93	253
254	93			94	254
255	93			95	255
256	94			95	256
257	94			96	257
258	95			96	258
259	96			97	259
260	96			97	260
261	96			98	261
262	97			98	262
263	97			98	263
264	98			99	264
265	98			(Thru SSS = 320)	265
266	98				266
267	99				267
(Thru SSS = 320)					

APPENDIX I: RAW SCORE CONVERSIONS (HALF POINT) OF AFQT *TO PERCENTILES IN 1944 and 1980 METRICS*

Table I-1. RAW Score Comparisons (Half Point) of Armed Forces Qualification Test (AFQT) to Percentiles in 1944 and 1980 Metrics
30 March 1984

RAW AFQT SCORE	1944	1980	RAW AFQT SCORE	1944	1980	RAW AFQT SCORE	1944	1980	RAW AFQT SCORE	1944	1980
0.0	1	1	26.5		2	52.0	18	17	77.5		49
0.5		1	27.0	4	2	52.5		17	78.0	54	50
1.0	1	1	27.5		3	53.0	19	18	78.5		51
2.0	1	1	28.0	5	3	53.5		18	79.0	56	52
2.5		1	28.5		3	54.0	20	19	79.5		53
3.0	1	1	29.0	5	3	54.5		19	80.0	58	54
3.5		1	29.5		3	55.0	20	20	80.5		55
4.0	1	1	30.0	6	4	55.5		20	81.0	59	56
4.5		1	30.5		4	56.0	21	21	81.5		57
5.0	1	1	31.0	6	4	56.5		21	82.0	61	58
5.5		1	31.5		4	57.0	22	22	82.5		59
6.0	1	1	32.0	7	4	57.5		22	83.5	63	60
6.5		1	32.5		5	58.0	23	23	83.0		62
7.0	1	1	33.0	7	5	58.5		23	84.0	65	63
7.5		1	33.5		5	59.0	24	24	84.5		64
8.0	1	1	34.0	8	5	59.5		24	85.0	66	65
8.5		1	34.5		6	60.0	25	25	85.5		66
9.0	1	1	35.0	8	6	60.5		25	86.0	68	67
9.5		1	35.5		6	61.0	26	26	86.5		68
10.0	1	1	36.0	9	6	61.5		26	87.0	70	69
10.5		1	36.5		6	62.0	28	27	87.5		70
11.0	1	1	37.0	9	7	62.5		27	88.0	72	71
11.5		1	37.5		7	63.0	29	28	88.5		72
12.0	1	1	38.0	10	7	63.5		28	89.0	74	73
12.5		1	38.5		8	64.0	30	29	89.5		74
13.0	1	1	39.0	10	8	64.5		30	90.0	76	75
13.5		1	39.5		8	65.0	31	30	90.5		76
14.0	1	1	40.0	11	8	65.5		31	91.0	78	77
14.5		1	40.5		9	66.0	33	31	91.5		78
15.5	1	1	41.0	12	9	66.5		32	92.0	80	79
16.0	1	1	41.5		10	67.0	34	33	92.5		80
16.5		1	42.0	12	10	67.5		34	93.0	82	81
17.0	1	1	42.5		10	68.0	36	35	93.5		82
17.5		1	43.0	13	11	68.5		35	94.0	83	83
18.0	1	1	43.5		11	69.0	38	36	94.5		84
18.5		1	44.0	13	11	69.5		37	95.0	85	85
19.0	1	1	44.5		12	70.0	40	38	95.5		86
19.5		1	45.0	14	12	70.5		38	96.0	86	87
20.0	1	1	45.5		12	71.0	42	39	96.5		88
20.5		1	46.0	14	13	71.5		40	97.0	86	89
21.0	1	1	46.5		13	72.0	44	41	97.5		90
21.5		1	47.0	15	13	72.5		42	98.0	88	91
22.0	1	1	47.5		14	73.0	46	42	98.5		92
22.5	1	1	48.0	15	14	73.5		43	99.0	90	93
23.0	2	1	48.5		14	74.0	48	44	99.5		94
23.5		1	49.0	16	15	74.5		45	100.0	91	94
24.0	3	2	49.5		15	75.0	49	46	100.5		95
24.5		2	50.0	16	16	75.5		46	101.0	93	96
25.0	3	2	50.5		16	76.0	50	47	101.0		97
25.5		2	51.0	17	16	76.5		47	102.0	95	98
26.0	4	2	51.5		16	77.0	52	49	102.5		99

Table I-2. AFQT 8A

Cumulative Proportion for Half-Point Raw Score Values in 1980 Youth Population After Adjustment for Numerical Operations Subtest

Raw Score	Cumulative Proportion[a]	Raw Score	Cumulative Proportion	Raw Score	Cumulative Proportion[a]	Raw Score	Cumulative Proportion
.0	.000054	30.0	.035757	56.0	.207313	82.0	.581737
.5	.000108	30.5	.037807	56.5	.212271	82.5	.592756
1.0	.000162	31.0	.039856	57.0	.217231	83.0	.604044
2.0	.000214	31.5	.041906	57.5	.222207	83.5	.615468
2.5	.000260	32.0	.044005	58.0	.227206	84.0	.626892
3.0	.000303	32.5	.046201	58.5	.232216	84.5	.638109
4.0	.000347	33.0	.048447	59.0	.237226	85.0	.648912
5.0	.000387	33.5	.050692	59.5	.242235	85.5	.659423
5.5	.000423	34.0	.052937	60.0	.247245	86.0	.669761
6.0	.000465	34.5	.055199	60.5	.252255	86.5	.680013
7.0	.000523	35.0	.057512	61.0	.257265	87.0	.690265
7.5	.000604	35.5	.059879	61.5	.262263	87.5	.700517
8.0	.000722	36.0	.062264	62.0	.267210	88.0	.710769
8.5	.000856	36.5	.064652	62.5	.272093	88.5	.721125
9.0	.000991	37.0	.067114	63.0	.276948	89.0	.731772
9.5	.001126	37.5	.069715	63.5	.282383	89.5	.742687
11.5	.001261	38.0	.072383	64.0	.288977	90.0	.753682
12.0	.001396	38.5	.075052	64.5	.296172	90.5	.764360
12.5	.001531	39.0	.077932	65.0	.303360	91.0	.774403
13.0	.001666	39.5	.081234	65.5	.310467	91.5	.784127
14.0	.001832	40.0	.084748	66.0	.317522	92.0	.793852
14.5	.002057	40.5	.088251	66.5	.324656	92.5	.803561
15.0	.002299	41.0	.091730	67.0	.331947	93.0	.813226
15.5	.002507	41.5	.095184	67.5	.339317	93.5	.822784
16.0	.002717	42.0	.098573	68.0	.346687	94.0	.832201
16.5	.003051	42.5	.101875	68.5	.353969	94.5	.841555
17.0	.003576	43.0	.105140	69.0	.361078	95.0	.850909
17.5	.004208	43.5	.108406	69.5	.368099	95.5	.860262
18.0	.004891	44.0	.111722	70.0	.375329	96.0	.869616
18.5	.005655	44.5	.115136	70.5	.383118	96.5	.878970
19.0	.006484	45.0	.118600	71.0	.391400	97.0	.888324
19.5	.007328	45.5	.122065	71.5	.399825	97.5	.897677
20.0	.008173	46.0	.125594	72.0	.408249	98.0	.907031
20.5	.009018	46.5	.129253	72.5	.416674	98.5	.916385
21.0	.009862	47.0	.132977	73.0	.424993	99.0	.925738
21.5	.010706	47.5	.136701	73.5	.433102	99.5	.935082
22.0	.011548	48.0	.140425	74.0	.441105	100.0	.944406
22.5	.012387	48.5	.144149	74.5	.449065	100.5	.953368
23.0	.013328	49.0	.147873	75.0	.456734	101.0	.961382
23.5	.014482	49.5	.151542	75.5	.463951	101.5	.968552
24.0	.015790	50.0	.155083	76.0	.470963	102.0	.975474
24.5	.017191	50.5	.158529	76.5	.478123	102.5	.981828
25.0	.018638	51.0	.161971	77.0	.485580	103.0	.986824
25.5	.020132	51.5	.165446	77.5	.493392	103.5	.990634
26.0	.021720	52.0	.169228	78.0	.501810	104.0	.993873
26.5	.023356	52.5	.173593	78.5	.510820	104.5	.996936
27.0	.024991	53.0	.178250	79.0	.520070	105.0	1.000000
27.5	.026626	53.5	.182906	79.5	.529605		
28.0	.028261	54.0	.187631	80.0	.539579		
28.5	.029964	54.5	.192493	80.5	.549761		
29.0	.031802	55.0	.197424	81.0	.560135		
29.5	.033743	55.5	.202361	81.5	.570853		

[a]Cumulative proportion after smoothing raw frequency with S3RSSH.

END

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